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THE IRON AGE

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▲▲▲ THE IRON AGE ▲▲▲

APRIL 25, 1940

ESTABLISHED 1855

Vol. 145, No. 17

Target Practice for University Students

"DELIGHTFUL task! to rear the tender thought,
To teach the young idea how to shoot."

In these words, in his poem, "The Seasons," James Thomson paid tribute to his contemporaries, the educators of the 18th century.

He does not say just what the young people were to be trained to shoot at. That is left to the imagination. Perhaps their aim was to be directed at truth, or talent or high accomplishment of some sort or other.

What is modern youth being taught to shoot at? One may well wonder that, as you will, when you read the address recently given before a gathering of hardware merchandisers and manufacturers at Palm Beach by the President of the University of Florida. You will find extracts from his address on page 54 of this issue. It will be worth your while to read them, if you want to know what some educators think of you and your products of mechanization. And presumably when an educator holds such views, he does not withhold them from those whose tender years have been entrusted to his institution for thought formation.

Dr. John J. Tigert doesn't like machines. Nor the machine age, as you will see when you read the parts we have published from his talk entitled "Machine Made Misery." He accuses it of causing unemployment, robbery and murder; of promoting seduction and war; of eradicating personality and talent and of breaking violins.

Dr. Tigert is no "fly-by-night" educator. If he were, his views would have no importance. He was the first Rhodes Scholar from Tennessee. He has held such positions as U. S. Commissioner of Education; chairman of the Federal Council on Citizenship Training; vice-chairman of the Federal Board for Vocational Education. He was the president of the Association of Colleges and Universities of Kentucky and member of the National Council of the Boy Scouts of America.

Such men have broad opportunity to teach young ideas and young minds to shoot. And if his expressions at Palm Beach reflect his philosophy, one wonders whether the target aimed at is not the American System of Enterprise and the Machine. With the intent of shooting them full of holes!

If men of his position think as they do about the destructive social effects of your work and your products, the slowing down of the machine by legislative mandate may not be as remote as you think.





Inland Ore Freighters First to Open the 1940 Shipping Season!

FIRST ship in 1938 to break through the ice, pass the Soo, and open the upper lakes shipping season was the Inland Steel freighter, Philip D. Block.

Again in 1939, navigation was opened by the L. E. Block, flagship of the Inland Fleet, which holds the record for transporting the largest single ore cargo of 15,778 gross tons.

Now in 1940, the Inland Fleet moves north into the ice fields to bring down raw

materials from Inland mines and quarries.

The Inland Fleet is an important unit of one of America's largest integrated steel producers, for Inland owns ore and coal mines, quarries, ships, docks and mills—every facility for steel making. From the time the raw materials leave the ground until the last metallurgist makes the final inspection and the steel is ready for the customer's use, Inland maintains continuous unified control of every process.

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Hardenability and Quenching

THIS article treats of the quenching aspect of steel hardening and explains in simple terms the use of charts developed, (1) to ascertain severity of quench, and (2) to relate values to a single standardized quench. In this first section of a two-part article, hardenability and quenching charts are presented, and an explanation is given for the use of the charts.

o o o
By M. A. GROSSMANN

and

M. ASIMOW

*Director of Research and Metallurgist
Respectively, Carnegie-Illinois Steel
Corp., Chicago*

o o o

WHEN a piece of steel is hardened by quenching, the extent to which it hardens is governed by (1) the hardenability or potential hardening capacity of the piece about to be quenched, and (2) the rate at which the piece cools, which is governed by the size of bar and by the manner of cooling it. The manner of cooling (circulating brine, still oil, etc.) determines the rate of heat abstraction from the bar, termed "severity of quench." Since both hardenability and quenching are involved in all actual hardening tests, any attempt to evaluate hardenability alone must take account of severity of quench.

In measuring the hardenability of steel in practice, probably the most widely used test is the one in which a bar is quenched, then broken in half or cut across the cross-section with a grinding wheel, the resulting cross-

section being then ground flat and explored for hardness. The data thus obtained are plotted in the form of a hardness traverse curve, such as those shown in Figs. 1, 2 and 3. Such curves show accurately the degree of hardening achieved when using the particular steel in the particular bar size, when subjected to the particular quench employed.

With the single exception of the severity of quench, the factors involved in such a test are usually known quite adequately. That is to say, the composition of the steel can be determined, as can also its grain size, and the bar diameter is of course always stated, but the severity of quench is usually known only vaguely. While the quench is usually described, being stated perhaps to be an oil quench, a water quench or a brine quench, this is not by any means a sufficiently accurate

designation. The point is that the severity of quench, even when using the same quenching medium, is influenced markedly by the degree of circulation of the quenching medium itself or (what amounts to the same thing) the stirring of the specimen in the quenching bath. The degree of this variation is far greater than is commonly taken into account.

Now it is clear that if two bars of steel, entirely alike in every respect, are quenched in such a manner that the severity of quench differs, then the bar quenched more severely will harden to a greater degree, and in a fracture or etch test will show a greater "depth of hardening." This circumstance, while well recognized in principle, is nevertheless not infrequently overlooked in practice, simply because it is not realized that quenching severity may show unexpected va-

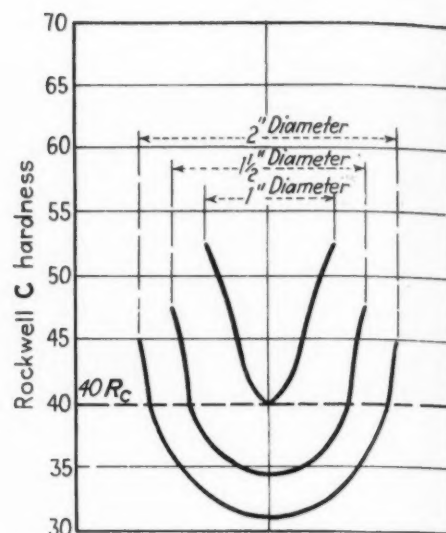
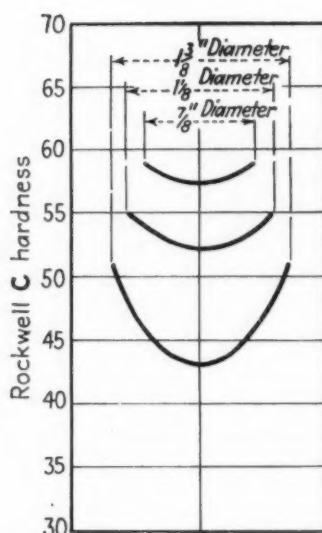
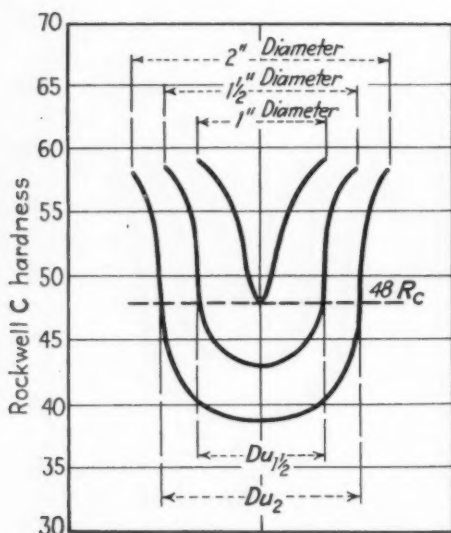


FIG. 1 (left), Fig. 2 (middle), and Fig. 3 (right)—Hardness traverse curves. In each case a bar of steel has been hardened, then broken in half and explored for hardness over the cross-section.

riations. As stated above, what is not generally realized is that the severity of quench may vary over an unexpectedly wide range due to different degrees of stirring, even when the quenching media are practically the same.

In view of these circumstances then, it may be assumed to be extremely helpful to have a simple method for measuring severity of quench, and particularly so if it were then possible to translate results from one severity of quench to another. Thus for different laboratories or for different quenching installations, it would be useful to designate severity of quench in actual numbers. If two laboratories A and B were employing a water quench, under such a scheme it might turn out that the severity of quench in Laboratory A would be $H = 2.0$, while in Laboratory B the apparently similar quench would turn out to have the greater severity $H = 3.0$. Further, supposing it were found that, in quenching a 1-in. round, Laboratory A found a depth of hardening 0.10 in. and Laboratory B found a depth of hardening 0.16 in. The system to be described here would show that this particular difference in hardening was accounted for fully and completely by the difference in severity of quench $H = 2.0$ and $H = 3.0$.

Another circumstance that is not infrequently encountered in practice is a difference between laboratory test results and plant production results, when using the same steel and ostensibly the same quench. Here again it is profitable to examine severity of

quench so as to rule out this possible variable.

It may thus in many cases be useful, possibly even imperative, to ascertain severity of quench quantitatively, and an easy method for doing so is to be described in this article. Only then can hardenability results be referred to a single standard quench, and a method will be described for doing this also.

Hardenability, Quenching Charts

The accompanying hardenability and quenching chart, the colored chart, Fig. 4, is in the form of a paper chart over which a rectangular sheet of tissue paper or of celluloid (or glass) is to be laid for the calculations. This chart is used for measuring severity of quench; the points (as described below) are plotted on the overlying tissue paper or transparent celluloid, which is then moved back and forth until the points match one of the colored curves. To plot the readings when employing celluloid, use a "China Pencil" or "Cellophane Pencil" (an ordinary colored pencil or crayon will not work). A good color is a medium blue green. To clean the markings off the celluloid after use, employ carbona, energine or any similar cleaning fluid or "lighter"-fluid. When using the colored chart, Fig. 4, with the rectangular tissue paper or celluloid cover, be sure that the lower edge of the cover slide coincides with the lower edge of the chart or page, and when moving the slide to find the proper curve, be sure that these lower edges remain together, otherwise the readings are meaningless.

For estimating the "ideal critical size," the figures are read from the other two charts, Figs. 5 and 6.

Part I Use of the Chart

The following introduction states the exact steps to be followed in determining H , severity of quench; and D_c , ideal critical size. The charts may thus be used adequately without studying the remainder of the text, which describes in detail the underlying principles and the manner of constructing the charts.

The color chart, Fig. 4, is used to determine severity of quench, called "H-value." When severity of quench in a particular set-up is to be determined, select a single bar of steel and prepare from it a series of rounds of different diameters (preferably at least three sizes). The bar size and the hardenability should be such that all of the sizes after quenching have overlapping hardnesses, in other words so that a particular hardness may be selected which is found at some position in all of the three sizes.

Curves such as in Fig. 1 or Fig. 3 are suitable, whereas those in Fig. 2 are not suitable. Suppose the severity of quench represented by Fig. 1 is to be determined. The scheme depends on measuring the value called D_u in relation to the diameter of the bar D . Consider in Fig. 1 the hardness level $48 R_c$, and consider first the $1\frac{1}{2}$ -in. diameter bar. In Fig. 1, measure the diameter bounded by the Rockwell hardness $48 R_c$, as indicated for example by the distance marked $D_{u\frac{1}{2}}$ in Fig. 1. Measurement shows that this distance is 0.99 in.; $D_u = 0.99$. Since the bar diameter D is $1\frac{1}{2}$ in.,

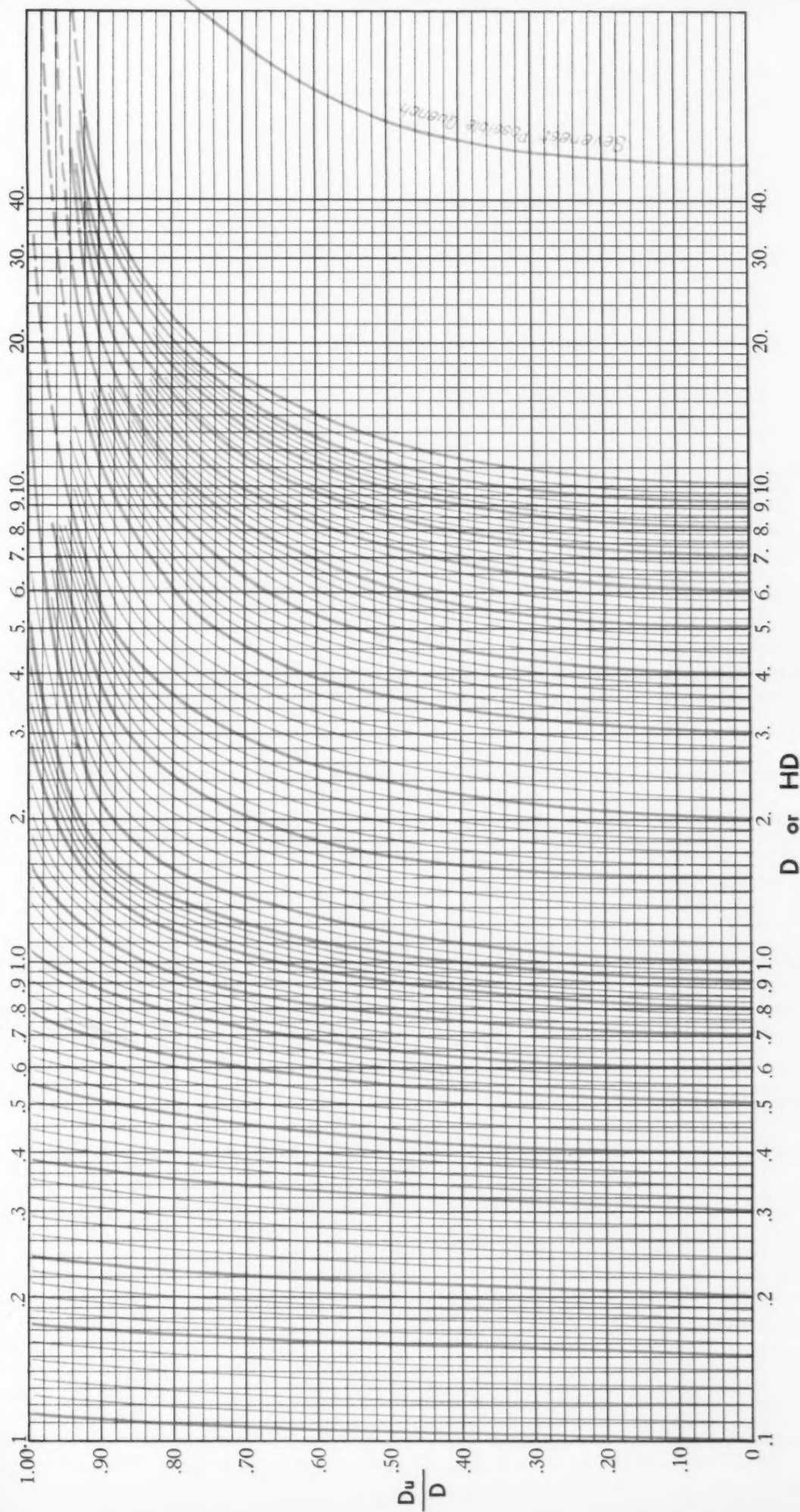


FIG. 4—Hardenability and quenching charts. Copyrighted 1939, by Carnegie-Illinois Steel Corp.

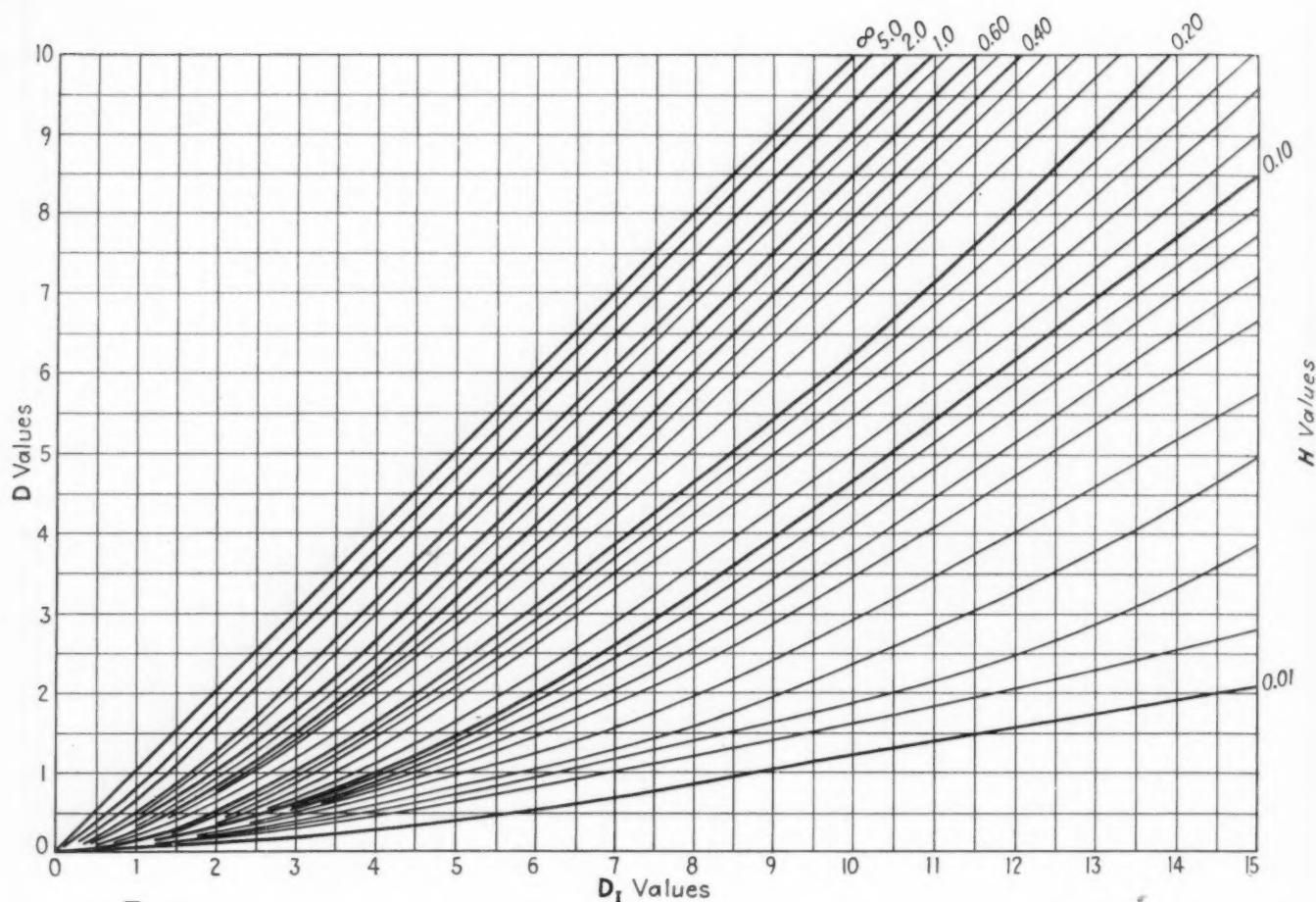


FIG. 5—Relationships among ideal critical size D_i , actual critical size D , and severity of quench H .

there results $\frac{D_u}{D} = \frac{0.99}{1.50} = 0.66$. In the case of the 2-in. bar, as indicated at D_u in Fig. 1, it is found that $D_u = 1.54$ in. so that in this case $\frac{D_u}{D} = \frac{1.54}{2.00} = 0.77$. In the case of 1-in. bar, the curve just touches the position 48 R_c, so that D_u is 0, so that following the same form there results $\frac{D_u}{D} = \frac{0}{1.0} = 0$. Therefore, there obtains the following table:

D	$\frac{D_u}{D}$
1.00	0
1.50	0.66
2.00	0.77

Observe now that, on the color chart Fig. 4, the abscissae at the bottom are marked D or HD , and the ordinates at the left are marked $\frac{D_u}{D}$.

The points are now plotted on the overlying paper or celluloid, being careful to place it in position as previously described. On the bottom line of the chart find the position marked 1.0, indicating that $D = 1.0$, and plot the

first point of the above table on the bottom line, since this is the position (shown at the left) where $\frac{D_u}{D}$ is 0.

Then find the position 1.50 at the bottom, namely at the appropriate position between 1.0 and 2.0, and follow this vertical black line perpendicularly upward (disregarding the orange curves); at the left find the position

$\frac{D_u}{D} = 0.66$, at the proper place between

0.60 and 0.70, and follow this horizontal black line across until it intersects the previously mentioned vertical line 1.50; at this position place the second mark. For the third position find at the bottom of the page the position $D = 2.0$, follow this black line upward and make a mark at the position (judged from the ordinates at the left) where $\frac{D_u}{D} = 0.77$.

Now, slide the transparent cover (with its marks) over the underlying chart, being careful to move the cover slide in line with the underlying paper as previously described. Paying attention now to the curved orange colored lines, move the transparent cover until

all three points marked on the cover fall on the same orange curve. This will be found to occur when the bottom point is at the position 5.0, the intermediate point being now on the vertical black line 7.5 and the uppermost point on the vertical black line 10.0. The orange colored curves have to do with the values HD , which is the product of H (severity of quench) times D (diameter of bar). The new position then indicates that, for the 1-in. bar (the lowermost point), the product $HD = 5.0$. It is then found by simple division that

$$H = \frac{HD}{D} = \frac{5.0}{1.0} = 5.0.$$

The three points all show the same H -value, since for the $1\frac{1}{2}$ -in. bar HD is 7.5 so that

$$H = \frac{HD}{D} = \frac{7.5}{1.5} = 5.0.$$

In the same way for the 2-in. bar,

$$H = \frac{HD}{D} = \frac{10.0}{2.0} = 5.0.$$

The severity of quench is therefore $H = 5.0$.

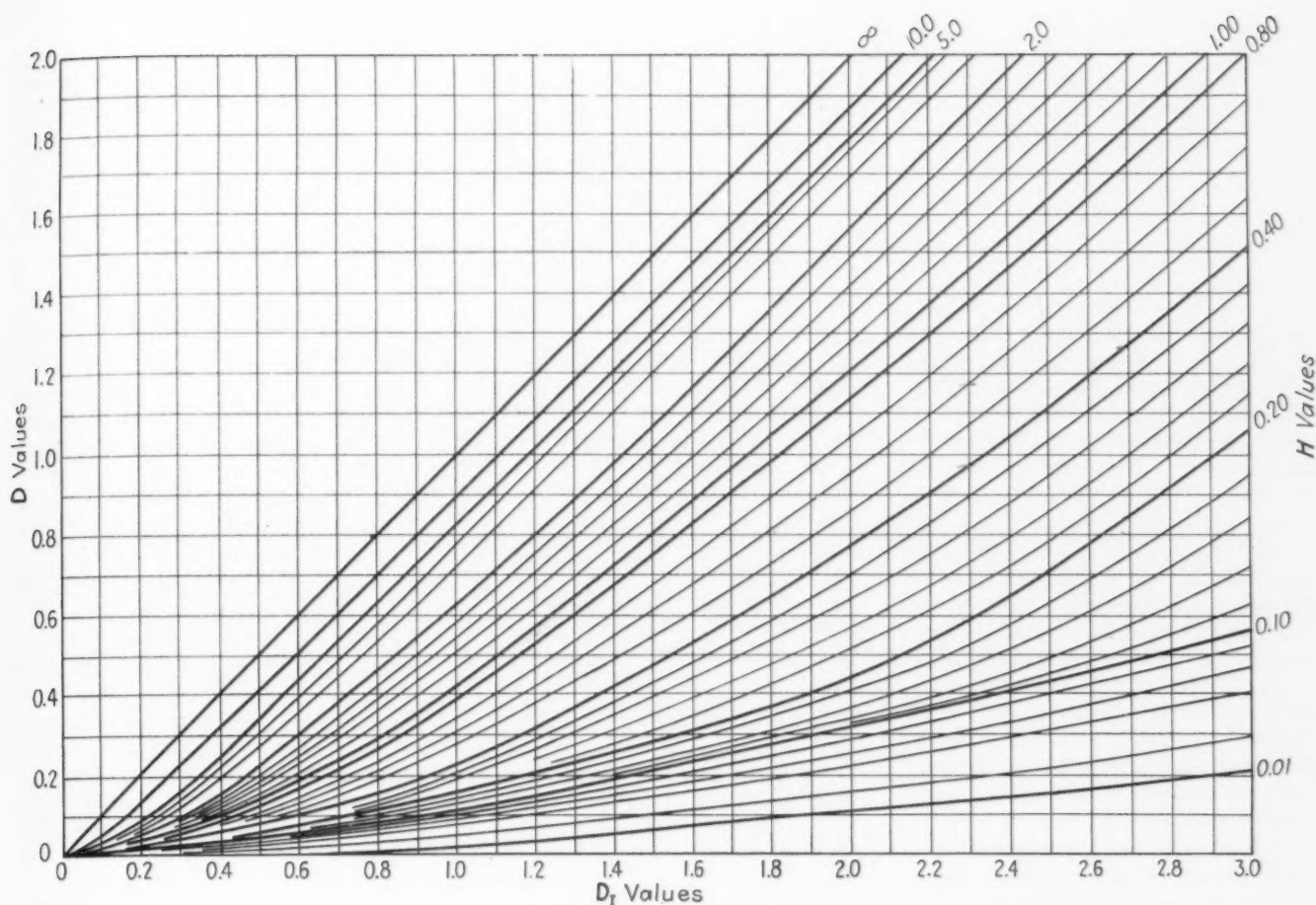


FIG. 6—Same as Fig. 5 but using a different scale. Both graphs copyrighted 1939, by Carnegie-Illinois Steel Corp.

The other charts Fig. 5 and Fig. 6 may be used to refer any actual quench to the "ideal" (severest possible) quench.

Ideal Critical Size, D_1

The "critical size" has been defined as the size in which the unhardened core is just absent, namely the size which is just "hardened throughout"

in a fracture or etch test, so that $\frac{D_u}{D} = 0$. This corresponds to the 1-in. round in the example just stated, where $\frac{D_u}{D}$ was 0. Turning now to

Fig. 6, note that the ordinates as marked at the left are marked D-values, and these refer to the actual critical size as found in the test. The abscissae as marked at the bottom are called D_1 values, indicating the critical size which would have been obtained had the quench been ideal (severest possible).

In the present case, where the critical size was $D = 1.0$ and the quench was $H = 5.0$, find at the left the D-value 1.0, follow the horizontal

black line until it intersects the inclined black line which (at its upper right-hand end) is marked 5.0. From this intersection, follow downward to read the D_1 value at the bottom of the page and it will be found that it is very slightly less than 1.2, so that the ideal critical size would be designated $D_1 = 1.19$. This is a quantitative designation of the hardenability of this steel, independent of laboratory variations in severity of quench. It indicates the size which would just have been "hardened through" (no unhardened core) had this steel been given an ideal quench.

Explanation

The previous paragraphs have indicated the manner of using the charts, but because of brevity have left many steps unexplained. The following discussion offers a more complete description.

Special attention is directed to the following items: (1) A simple way to arrive at an understanding of the charts is to consider cooling-times within the bars (time occupied by a specific point in the bar in cooling dur-

ing quenching). A particular cooling-time (in a specific steel) results in a particular hardness, hence the propriety of inferring that points which have the same hardness had the same cooling-time (the steel being identical); (2) The "unhardened core" (in a piece not fully hardened) is bounded by a line where the steel is just half-hardened (50 per cent martensite). Thus the "hardened rim" is not by any means fully hardened throughout to 100 per cent martensite, and this is an important and useful circumstance.

The following symbols have been employed:

D = diameter of quenched bar.

D_u = diameter of unhardened core or diameter bounded by a line of arbitrarily selected hardness.

D_1 = diameter of bar in ideal (severest possible) quench.

H = severity of actual quench.

Ed. Note: Next week the authors conclude this paper with a detailed discussion of the basis for the charts, and the origin and significance of the term $\frac{D_u}{D}$

TESTING BOND HARDNESS

OFTEN it is the case that one new development leads to another originally unforeseen development. Thus, a new method of stone grading has been developed as an outgrowth of a new process of surface finishing.

For the past several years, the Foster Machine Co., Elkhart, Ind., has been engaged in the manufacture of Superfinishing machines. This process involves the removal of a surface layer of material (see *THE IRON AGE*, Sept. 1, 8, 22, Nov. 17, 1938), and it has been necessary to study a number of different operating variables. Among the most important of these variables has been the selection of proper abrasives or "stones."

This selection of abrasive stones has often been difficult, and, once made, hard to duplicate, because stone manufacturers apparently do not properly and uniformly grade grit bond hardness. It is the purpose of this article to describe how a satisfactory method of grading abrasive stones, grinding wheels, and Superfinishing stones, of medium and fine grit size, has been developed by the Foster metallurgical staff.

In order to clearly demonstrate the difficulties encountered, and how the solutions were reached, it seems advisable to review some of the basic principles which are essential to successful Superfinishing.

As many readers already know, Superfinish is a new method for the refinement of the usual commercial finishes such as are produced by grinding, etc. This fine finish is obtained by the unusual application of fine grit bonded abrasives (320 to 900 grit) to the surface, in a manner which is to be described.

There are several features which contribute to the production of the extremely smooth surfaces, which are uncovered down to base crystalline metal. Among these are the tools peculiar to the process—fine grit bonded abrasives, usually of cup or stick shape; the short multi-motions imparted to this tool; and the almost total absence of heat.

After experimentation involving the

trial of several thousand stones of every kind of bond and grade of hardness, as well as size and kind of grit, it was found that there were comparatively few uses (especially in work on ferrous metals) for any but vitrified bonded stones of an open or porous structure. Further, it was usually found that a grit size of 320 to 600 was advisable—and, just as in grinding, silicon carbide grit was more successful in work on cast iron, and aluminum oxide in the finishing of steel. These stones, whether they be of stick or cup shape, are applied to the rotating work with a series of rapid short motions (five or more motions preferred) designed to prevent accumulations of loads on the working face of the stone, and to avoid duplication of the paths of the grits.

While it is possible to introduce a greater complexity of motions in the Superfinishing of flat work than in cylindrical, it will serve the present purpose just as well, and be more easily explained, if this discussion be confined to the action of the stick type stones used in cylindrical work.

So, it should be instructive to set up a job and see how control of pressure, short stroke, low abrasive speed, viscosity of stone lubricant, and bond hardness of the stone can be used to produce a definite quality of finish, a finish which will automatically be duplicated on piece after piece of work.

Suppose a shaft bearing be taken for example. The first requirements are a means for rotating the shaft, and a mechanism for the application of the stone and its short motions or oscillation. Any of the conventional methods can be used for the shaft rotation, such as between lathe centers. For the application of the stone, and its oscillation, there are several machines available, from a simple inexpensive lathe attachment to others capable of high production. In any of them, the stick type stone used is approximately 60 per cent of the work diameter in width, and of about the same length as the bearing, unless it is unusually long. The spring pressure, applied to hold the stone lengthwise against the work, varies from a few

ounces to not over 20 lb. per sq. in. of stone area in contact with the work.

As the shaft rotates, the stone is oscillated at right-angles to the direction of the shaft rotation, at a speed of 350 to 450 complete cycles per min., and with an amplitude of $\frac{1}{8}$ to $\frac{1}{4}$ in. No other motion is imparted to the stone, unless the length of the bearing makes it necessary to traverse the Superfinishing head.

Where traverse is not necessary, the finishing operation seldom requires over 10 sec. to 1 min. for completion. Nevertheless, during that short period of time, the condition of the working face of the stone must go through a definite cycle if the pre-determined quality of finish is to be obtained. The previous finish has probably been produced by grinding and the surface is composed of alternate minute hills and valleys. For some depth, the intense pressure, high speed and resultant heat of the grinding wheel has converted the metal of this surface to a fragmented and amorphous or smear-metal state, and, in the case of hardened steel, to an annealed condition. As the stone is applied to such a surface, it first encounters the peaks of the hills, and here the unit pressure is high, due to the small area of contact. Stone to metal contact is easily attained no matter how high the viscosity of the lubricant may be. If the proper grade or bond hardness of stone is used, it will at this point break down to some extent, presenting new and sharp grits, thus rapidly removing the hills or peaks in comparatively large chips. The flow of lubricant here has only one purpose—to wash away abraded particles of metal and stone.

As the peaks are removed, and become plateaus, the unit pressure on the grit points becomes less, because the area of contact between stone and metal has increased, and it becomes increasingly difficult for the points to penetrate or bite into the work. If the points do not bite so deeply, sufficient leverage is not exerted upon them to pry out grits and thus dress and keep sharp the stone. So the stone becomes duller and duller as the area of contact becomes greater, and the unit

OF ABRASIVES ♦ ♦ ♦

By E. L. HEMINGWAY

Chief Metallurgist, Foster
Machine Co., Elkhart, Ind.

pressure becomes less. Naturally these dull teeth remove progressively thinner and smaller bits of metal, and it is the writer's belief that these much smaller particles of metal are immediately oxidized to the black oxide of iron (or copper, in the case of brass or bronze), and are deposited in the pores of the stone face. These deposits aid in building up a glaze on the surface of the stone, and also, by filling up the stone pores, contribute to an increase in contact area to the point where a lubricant of the proper viscosity will finally actually prevent further contact of stone and the work, and further removal of metal ceases.

Thus, there is an automatic cycle of rapid stock removal, followed by a progressive polishing action, controllable to any desired degree of surface smoothness by the correct selection of pressure, lubricant, surface footage, and bond hardness of stone. Application of the stone to another rough part will break down the glaze on the stone face, and the above described cycle will be repeated. It is rarely necessary to dress Superfinishing stones.

Incorrect Bond Hardness

While it is possible to control the point at which the stone stops removing any material at all, and thus the quality of finish, by variation of pressure, lubricant viscosity and surface footage, experience has shown that bond hardness of the stone is of much more importance. And, unfortunately, this feature has been much harder to control, due to the variations in testing methods employed by the abrasive stone manufacturers.

This brings up the question: What happens when the bond hardness proves harder or softer than there is reason to believe? When a stone of too great hardness is applied to a ground surface, these more rigidly supported grits are not removed, and the cutting action slows down sooner than desired. Further, the large particles of metal that may be removed by the first few passes of the grit often cling to them and become permanent "loads." A particle of this size will tear out the grit if the stone is of

correct grade, and both the grit and metal will be washed away by the lubricant. These loads, retained by the too rigidly held grits, immediately start tearing deep scratches in the work surface, and will ruin it if the stone is not removed. The condition is, in this case, never reached where particles of metal are removed which are thin enough to oxidize, and assist in producing a smooth finish.

When the stone in use has too little bond strength or hardness, its applica-

THIS new method of grading bonded abrasives employs an ordinary Rockwell hardness tester. The results have been extremely helpful in selecting proper stones for Superfinishing work, and the method could easily be adapted to other operations wherein bonded abrasives are used.

tion on the hill peaks results in an extremely rapid removal of metal, as the stone breaks down very fast. Unfortunately, after the hills have become plateaus, the bond still does not have sufficient strength to retain the grit under the reduced leverage and unit pressure, and the stone keeps right on cutting rapidly, removing particles of metal too large to oxidize and contribute to a polishing or burnishing tendency. The continuously sharp grit points will penetrate a lubricant of any viscosity, and there will obtain neither a polished surface nor a controlled cycle in any respect.

Oddly enough, it is possible for a stone to have so little bond strength and the grits be so loosely held that they do not possess rigidity enough to do any real amount of cutting, and what may be intended to be a stone of very large stock removing capacity, may do very little work at all.

It is possible, by the visual examination of a stone to determine whether

it has produced a satisfactory piece of Superfinished work. One that is of correct bond strength will always be discolored on its working face by the accumulation of oxide. None of this blackening means that the stone is too soft. If there be bright metallic particles firmly fixed on the face of the stone, it is, almost invariably, evidence that the stone is too hard.

Such are the effects produced by the use of stones of too great, or too little bond strength or hardness. It is possible to compensate for these conditions to some extent, by variation of lubricant viscosity, pressure on the stone, or surface footage of the work.

Suppose, however, that a high production machine has been designed for the finishing of parts of a uniform size, at the greatest possible efficiency. In such a machine it is, more often than not, much easier to change a set of stones than to change a tank full of lubricant, several sets of pressure springs, or the speed of rotation of several spindles. When, in such a case, the stone first selected happens to be a little off grade, it becomes a simple matter to go to one a little softer or harder, as required, if a means be available to accurately pre-determine these qualities.

In the experimental laboratory it has been necessary to superfinish hundreds of sample parts sent in by prospective purchasers of equipment. Naturally, very little experimental work in determining the proper grade of stone could be done on a single sample sent in, because it could easily be so much reduced in size by a stone too soft, or too deeply scratched by a too hard, loaded stone, that the impression made on the sender would be decidedly unfavorable. So, again, it is readily apparent that some accurate means of pre-determining the bond strength, or cutting capacity of stones was not only desirable, but almost absolutely necessary.

The above described sample work was first undertaken in November, 1938. Until September, 1939, this work was a continual source of difficulty. Unless a stone, that had actually been work tested, was available,

it was never known what results could be expected. It was the rule rather than the exception that from two to six, or more, stones be tried before one was found that would do a satisfactory job.

New Stone Testing Method

One handicap was a feeling that surely, if there was an adequate method of stone testing it would have been discovered long ago, and put into use. Finally, C. B. Whitmeyer suggested that the Brinell method of hardness testing be tried. The writer had held the opinion that the diamond would be found to be the only practical testing tool material. It was felt that no other would be hard enough to get consistent results on a reasonable number of tests, under such abrasive conditions. It also seemed obvious that the pressure obtained with the Brinell would surely break many stones. While later work proved that the use of a diamond was not necessary, it was natural, under the circumstances, to turn to the Rockwell method.

For the information of those not acquainted with these two hardness testers, both of these machines are used to find the hardness of materials, usually metals, by the indentation method, under a fixed load. In the Brinell method, a hardened steel ball, of 2/5 in. diameter, is pressed into the material, under a load of either 500 or 3000 kg., depending upon its hardness. The impression made by the ball is then measured for width, and the wider it is, the softer the material is considered to be. The heavy load necessary to press so large a ball into the tested material would break, or injure the average sized stone used in Superfinishing.

The Rockwell uses the same principle of indentation under a fixed load, but instead of measuring the width of the impression, its depth is measured directly by a needle and dial. The penetrator used on hard materials is a cone shaped diamond of 120 deg. included angle, and with a slightly rounded tip. With the usual load of 150 kg., its penetration is only a few thousandths of an inch in hard metals. When testing soft materials, a 1/16 or 1/8 in. diameter round steel ball is used in place of the diamond, with a 60 or 100 kg. weight instead of the 150 kg.

The dial is divided into 100 points, and one complete circuit of it by the needle represents a penetration of 0.008 in. Two of these 100-point scales are provided, one with black and one with red numbers, with zero points 30 points apart. This is desirable when using

different combinations of penetrators and load weights, as the range of hardness of a certain material may show some minus numbers on one dial, but not the other. In the use of both the Brinell and Rockwell machines, the higher the hardness of the material tested, the higher will be the Brinell or Rockwell number.

Several changes have been made by the makers of the Rockwell machine in the method of application of the load on the penetrator. In the early machines the load was applied through a leverage system, which later events proved to be subject to some frictional losses, when using the lighter 60 kg. weight. Later models apply the load through a much simpler system, which results in almost a dead weight application, with practically no friction.

Preliminary tests were begun with the use of one of the old models. First trials at testing stones, with the diamond and the load of 150 kg., immediately proved that considerably less pressure was necessary. The diamond penetrated the stone to a far greater depth than it did when testing steel, and the indicator needle made two or three circuits of the dial. After further experiment, it was found that the 60-kg. load was the most satisfactory one available, giving a penetration averaging 0.009 in. on stones of hardness suitable for Superfinishing.

However, the "C" or black scale, usually used with the diamond, gave a great many minus readings, so the "B" or red scale was used instead. Approximately 90 per cent of the stones used in Superfinishing will thus show a plus number. It seemed desirable to so alter the setup that all readings would be plus, but that would necessitate the use of non-standard weights, or alteration of the machine. Consequently the idea was, at that time, abandoned.

After thus working out the combination of load and scale to be used, there followed a systematic testing of stones. Fortunately, those first tested were of unusual uniformity as to the individual stone. Had some that were found later been originally tested, the results would not have been so encouraging. But, each one of the first lot tested within one to three points of uniformity, from end to end. Trial of another lot of a different marked grading showed a quite different Rockwell hardness, yet all stones of this second lot were nearly identical in hardness.

Eleven separate lots of stones were on hand at this time, all from the same manufacturer. Seven of these lots

checked quite uniform—from 1 to 3 points difference in any one lot, and 27 points from the hardest to the softest lot. Two other lots had apparently been mixed before being marked for grade, as one-half of each tested 9, and the other half 32. Two more small lots of 800 and 900 grit showed a scatter of 8 and 16 points respectively.

Having thus seen that a lot of two dozen stones would test so uniformly, and that different lots checked a reasonable number of points apart, it seemed that the investigation was progressing satisfactorily. Each lot was now listed in the order of the increase in Rockwell hardness, and compared with the manufacturers' alphabetical grading. It was immediately apparent that the Rockwell sequence of increase in hardness was not in accordance with that of the maker of the stones. This again was encouraging, because it seemed reasonable that here was the cause of the erratic results obtained in actual Superfinishing.

An example of this sort of condition had just recently occurred. Twelve large pilot bars were received to Superfinish, and an unsuccessful new type-of-bond stone was being used, and the job was taking 3½ hr. for each, when it should have been done in 20 min. When about half through, a lot of six, 3/4-in. square, 1000U, and one of six, 1-in. square, 1000U stones came in. It was felt that these were of too fine grit for such work, but it was decided to try them, as apparently they could be no worse. Surprisingly, the first bar was Superfinished in 18 min., and a beautiful job obtained. But, on trying the 1-in. square, no such speed was possible.

After the method of testing stones was developed, this job was recalled, and it was suggested that a hardness test might explain this difference in cutting quality. The hardness test of these two stones of identical manufacturer's grading, received at the same time, showed the 3/4-in. stone to check 4, and the 1-in. stone to be 16 hard. This increase in hardness of 4 to 16 seemed to be accompanied by a considerable decrease in cutting capacity.

During the next month, approximately 300 Superfinishing tests were made on the 11 original lots of stones. All of them indicated that the Rockwell test was as consistent with the cutting characteristics of these stones as could possibly be desired. The troubles in finishing customers' samples immediately began to diminish.

In order to fill plant needs and to

provide a wider diversity for test purposes, a large number of stones were ordered from two different manufacturers. Every bond hardness usable in Superfinishing work was included. Upon receipt of these stones, approximately 1500 separate hardness tests were made upon 402 of them.

These 402 were of 24 separate items, averaging about 17 stones per grade. Of the 24 lots, only 14 were found to be of satisfactory uniformity. Only four of these were estimated to be of anywhere near correct grading. Eight lots showed a variation of 6 to 17

points in hardness of stone to use in finishing any given hardness of steel. Another purpose was to locate, as accurately as possible, the correct hardness limits of each of the two manufacturer's gradings.

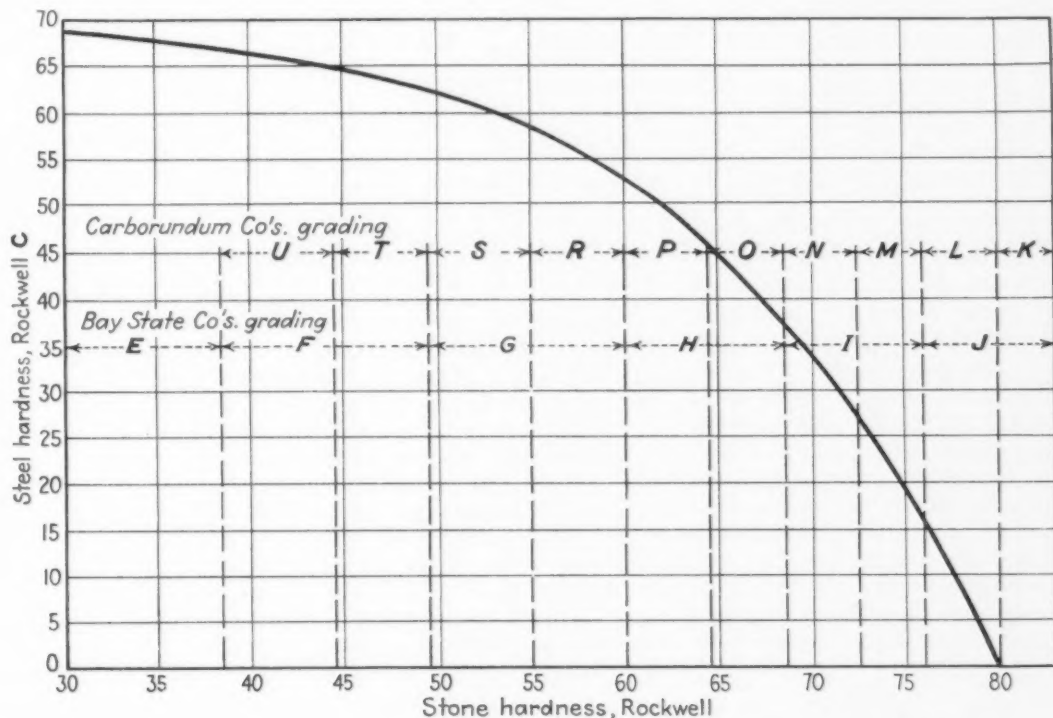
In all these tests no case was found where this new method of hardness testing was not proved consistent with the actual finishing qualities of the stones. The sample Superfinishing, which had been so difficult, became easier and easier as the relation between steel and stone hardnesses became more familiar. Data were care-

The data thus collected also made possible the graph desired. All this work was done with the diamond penetrator and the 60 kg. load on the old style machine. While the results had proved very satisfactory, it was felt that they should be checked by the use of a new instrument of the dead weight frictionless model, before making this new information available to those interested in this abrasive problem.

Recheck of Rockwell Data

During the latter part of this work, the writer was in correspondence with

RELATIONSHIP for selecting a vitreous bonded aluminous oxide stone for the cylindrical Superfinishing of steels of hardness shown. The finishing conditions are as follows: oscillation, 450 r.p.m.; grit, 500 to 600; surface feet of 60; 12 lb. per sq. in. pressure; profilometer reading of 2 to 3 micro-in.; and 15 per cent International Compound No. 155.



points Rockwell in each. Most lots which had a wide spread in hardness were also lacking in uniformity in individual stones, often as much as 10 points in one stone. This, it was felt, undoubtedly accounted for the uneven wear often observed. After these hardness tests were completed, the stones were arranged in a cupboard classified according to the Rockwell numbers, entirely disregarding the manufacturers' marked gradings.

Proving the Rockwell Test

During the next three months some 700 Superfinishing tests were made to further ascertain whether the cutting characteristics of these stones were actually consistent with the Rockwell hardness numbers. It was the intention, too, if this proved the preliminary work to have been on the right track, to collect the data necessary to the construction of a graph, which would in-

fully collected in order to locate the correct Rockwell hardness numbers for each of the two manufacturers' true gradings, as well as to construct the steel hardness versus stone hardness graph.

After the three months additional work was completed, grading limits were satisfactorily established. Having located these gradings, it was interesting to reconsider the gradings of the last 402 stones plus those originally tested, a total of 529 stones of 35 different lots. Out of these 35 lots, only six averaged correct grading. Thirteen lots averaged 10 to 22 points from true grading, or approximately 3½ letters of the Bay State Abrasive Co.'s system, or nearly seven grades of the Carborundum Co.'s. From this, it is obvious why the Rockwell hardness numbers were substituted for all stone grading.

the Chrysler Corp., and with the Wilson Mechanical Instrument Co., maker of the Rockwell tester. The encouragement of D. A. Wallace, of the Chrysler Corp., is hereby gratefully acknowledged. Also, through the kindness of Mr. Wilson, a new and latest model Rockwell was made available for continuance of the tests, with the recommendation that the possibilities of the use of the ⅛-in. steel ball be fully investigated. It was Mr. Wilson's belief that, owing to their small cost, their use might prove advisable.

Accordingly, upon receipt of the new instrument, approximately one thousand tests were made in order to determine the dependability of the ⅛-in. steel balls. These were made upon both relatively fine and coarse grits, and upon both hard and soft bonds. The conclusion was reached that approximately 50 to 60 tests could be made without danger of appreciable error.

While there will be some possibility that a ball will occasionally be used after it is too badly worn, it has been adopted as the standard for the test, and the use of the diamond discontinued. Another fact that contributed to this decision was that a better range of hardness numbers, with no Superfinishing stones giving minus ones, was obtained with the $\frac{1}{8}$ -in. ball and a 60 kg. load, than with any of the other several combinations of penetrator and loads which were tried.

The task still remained to correlate the results obtained with the old setup and that of the new. A set of 20 stones of varied bond hardnesses, and of the greatest uniformity available, were selected for this comparison. Ten tests were made on each stone, with each model instrument, to obtain a good average, and the results plotted. A range of minus five to plus 45, obtained in the original manner, became plus 15 to plus 85 by use of the new method. The plotted results were quite parallel, except at the soft stone end, where the results of friction in the old instrument seemed to have some effect.

After thus translating the original data into terms, or numbers of the newly adopted standard conditions, the revised graph was put into use in all sample and experimental work. At this writing, it has been in use for several weeks, with the same highly satisfactory results. In fact, in work with soft stones on hard steels, it is even more dependable, because of the greater accuracy and sensitivity of the new instrument.

Stone Testing Procedure

As already related, the use of the newer more frictionless type of Rockwell is recommended. However, it is believed that models B, F, G, H, K, L and M are satisfactory. The combination of $\frac{1}{8}$ -in. diameter steel ball and the 60 kg. load, which is designated by the makers of the machine as the "H," must be used. The speed of drop of the weight arm should be adjusted so the elapsed time from its release until it meets the stop is from 3 to 4 sec. The stone is placed on the anvil, and the test proceeds just as in testing a part made of steel. The weight arm is raised immediately after it comes to a stop, and the Rockwell number of the stone is read on the "B" or red scale.

Owing to the possibility that a stone may vary in hardness, it is well to test it at three points, both ends and the center. Many times stones will be found to vary from face to face as well. Most lots of stones have been

found to be either of satisfactory uniformity, or to show the same pattern of variation in each individual stone of the lot. Hard stones usually are more uniform than soft grades.

Use of the Graph

It will be noted in the accompanying graph that limits are shown for each grade of stone, used in Superfinishing, made by the Bay State Abrasive Co., and the Carborundum Co. Each alphabetical grade in the Bay State system is further divided into three numerical grades, for instance, 1H, 2H, and 3H. Once the proper Rockwell hardness of stone has been determined by trial Superfinishing, the manufacturer's grading can be found from the graph. Incoming shipments can also be inspected for correct grading thereby. It is not to be inferred that other makes of stones, than the two mentioned, are not recommended. Time has not been found for trial of all of them.

The curved line of the graph is intended as a guide to the selection of vitreous bonded aluminous oxide stones for the cylindrical Superfinishing of steels. To determine the proper hardness of stone to use, find the Rockwell "C" hardness of the steel on the vertical column of numbers at the left edge of the graph. Follow the line passing horizontally through this steel number to the right, until the curved line is met. Now follow the vertical line, intersecting the horizontal at that point, downward to the stone hardness number in the horizontal column at the bottom of the graph. This graph, together with complete instructions, may be obtained from the Foster Machine Co.

While experience has proved this graph to be accurate under the Superfinishing conditions noted, any changes in these variables will also change the selection of stones to a small extent. If, for instance, the surface footage of the work be increased above the 60 ft. per min. shown, a few points softer stone must be used to obtain the same 2 to 3 micro-in. Profilometer reading. If the percentage of International Compound No. 155 be decreased, a slightly harder stone is in order, because decreasing the viscosity causes a stone to cut faster, or act softer.

Variation of grit size will not usually affect the bond hardness as chosen by the graph, but the Profilometer reading so obtained will be less, when using finer grits, than the 500 to 600 shown, and slightly higher with the use of coarser grits. All these effects

are small, and are readily compensated for, after a reasonable amount of experience in Superfinishing.

It is desirable to start a Superfinishing operation at about 20 surface ft., and after removal of the ground finish, to increase this speed to close to 100 ft. This method, developed and patented by the Foster company, does not affect the selection of the stone according to the graph. As compared to the results obtained by the single speed of 60 ft., the stone will act softer during the slow speed, and more quickly remove the roughness of the part. Then, at high speed, the stone acts harder than normal, and produces a smooth surface of high polish more readily than at the single speed.

Conclusion

In addition to the information shown in the graph for the Superfinishing of steels, it is certain that the Rockwell method of testing bond hardnesses will prove of invaluable assistance in the superfinishing of any material. Suppose such work is being done upon a part made of cast iron. Application of a stone will quickly indicate whether it be too soft or too hard, and if other stones are at hand of different and known, not guessed hardness, the correct selection is comparatively easy.

The application of the Rockwell method has been so thoroughly tried in the Superfinishing process that there is no doubt as to its efficiency in the selection of stones for that purpose. It is further believed that it will prove equally valuable in the determination of cutting capacities of grinding abrasives, etc., within the range of grit sizes to which it can be applied. Grits of 320 to 1000 mesh have been successfully tested in a routine manner. It is not certain how much coarser grades can be checked with the $\frac{1}{8}$ -in. ball, but it is believed that the use of a larger ball, with a correspondingly larger load would test grits of any size.

The difficulties met in the Superfinishing of prospective customers' samples, and the setup of machines ready for delivery have thus been practically eliminated, but it was felt that only a small part of the possible benefit had been accomplished. The major purpose is to make this information available to the purchasers of equipment. It is also believed that every user of fine grit bonded abrasives, no matter what their application may be, will now have at his disposal an accurate means of predetermining the cutting characteristics.

How Alloying Elements Affect

HIGH ALLOY STEELS

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VARIOUS elements have definite and predictable effects on high alloy steels, and the author herein describes what these effects are and how various elements may be added to give steels definite service characteristics. Last week the functions of alloy additions were described, and detailed data given for manganese, nickel and cobalt steels. Herein, in conclusion, the author describes tungsten and molybdenum steels and chromium steels.

actually at a red heat because of the frictional energy developed. This was the origin of high speed steel, and the best of the modern steels was evolved when Dr. Mathews added vanadium to the tungsten-chromium steel then being used.

This steel, the 0.70 per cent carbon, 18 per cent tungsten, 4 per cent chromium, 1 per cent vanadium type, known as 18-4-1, has been the standard all-purpose high speed steel for very many years. There are, to be sure, many other types, with different proportions of tungsten and vanadium, and with additions of cobalt. In recent years, several steels have been marketed in which molybdenum has been used as a substitute for all, or some of the tungsten. In all these high speed steels the carbon is 0.65 per cent or higher.

Associated with these are a group of lower carbon steels containing tungsten, vanadium, molybdenum and chromium which are known as hot work steels. These may be heat treated so that they will retain a hardness of 375 to 450 Brinell after being tempered at 1100 deg. F., or higher. This makes them useful for dies, punches, mandrels, etc., for severe hot forging and hot extruding jobs, because they do not soften readily when they are in contact with the hot metals which are being worked. The high speed and hot work steels are all heated to tem-

peratures between 1800 deg. and 2400 deg. F. in the hardening operation. In these steels, the alloy additions have the functional effects of slowing up the transformation rate of the austenite, so that no high temperature transformation products are formed during cooling, and in forming high alloy carbides. The high temperature austenitizing treatments given these steels are for the purpose of allowing the alloy carbides to dissolve in the austenite and also serve to help retard the transformation. Then, when the martensite of these steels is tempered, these alloy carbides precipitate at temperatures up to about 1100 deg. F., and because of this precipitation the steel resists softening during tempering, and in some cases actually shows a re-hardening, or secondary hardening. In this respect, vanadium, tungsten, molybdenum, and chromium have specific effects in raising the temperature at which rapid softening takes place in tempering. Other specific effects of these elements in high speed steel are the formation of a tough martensite, and of complex carbides which contribute to the excellent cutting properties of the martensite.

A list of some high speed and hot work steels is given in Table II.

By far the most interesting of the alloying elements is chromium, first, because it has the specific effect of

TUNGSTEN AND MOLYBDENUM STEELS: Another of the very early high alloy steels was Mushet's steel. This was a high carbon manganese tungsten steel which was air hardening, and was a very satisfactory tool steel. About 40 years ago, Taylor and White, experimenting with a modification of Mushet's steel, discovered the marked advantage of a high heat treatment, followed by a tempering, which produced tools which would retain a good cutting edge even when the tools were run at such high speeds that the nose of the tool was

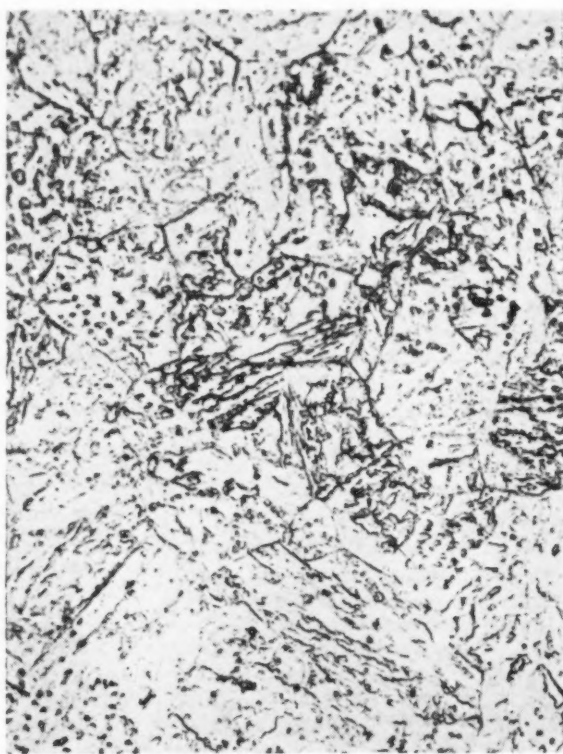


FIG. 5—0.13 C, 5.7 Cr steel, air cooled from 1650 deg. F.; $R_c = 36$. Hydrochloric-picral etch, and at 1000 diameters.



FIG. 6—0.12 C, 5.9 Cr, 1.2 Al steel, air cooled from 2200 deg. F.; $R_c = 7$. Etched with 5 per cent nital, and at 1000 diameters.

increasing the resistance of steel to corrosion and scaling; and second, because steels containing high amounts of chromium can be made to run the gamut of phase changes with delightful simplicity.

The first in the series of high alloy chromium steels is the low carbon 4 to 6 per cent chromium steel which almost always contains 0.50 per cent molybdenum in addition. This steel is widely used for still tubes in petroleum refineries in preference to plain carbon steel, because of its better corrosion resistance and better resistance to deformation under load at high temperatures, i.e., creep resistance. It is completely austenitic at temperatures over 1550 deg. F., and although this austenite will transform only to martensite during the air cooling of pieces with fairly heavy sections, it will transform to high temperature products on fairly slow cooling and can therefore be annealed to very low hardnesses.

This air hardening property is rather annoying under conditions where welding has to be done in the field, because

the martensite which forms when the steel cools down after the welding operation causes the part to be brittle. To overcome this quality, additions of ferrite forming elements have been made to this steel. These prevent the formation of much austenite at the welding temperature, and therefore, since there is no austenite at the high temperature, there can be no martensite formed at low temperature, and the steel in this manner becomes non-hardening, and suitable for welding. Additions of silicon, aluminum, columbium, and titanium, either alone or in combination have been used for this purpose.

The photomicrographs in Figs. 5 and 6 show the marked effect of the addition of a ferrite forming element to this 6 per cent chromium steel. The first represents a steel containing 0.13 per cent carbon and 5.7 per cent chromium as air cooled from 1650 deg. F.; the structure is martensite with a hardness of $R_c 36$. The second represents a steel with 0.12 per cent carbon, 5.9 per cent chromium, and 1.2 per cent aluminum, as cooled in air from 2200

deg. F.; the structure is mainly ferrite and only a small amount of martensite, and the hardness is $R_c 7$.

Steels with about 5 per cent chromium and about 0.40 per cent carbon, with small additions of molybdenum, vanadium, and tungsten, make very satisfactory hot work steels. The chromium makes the steel deep hardening, and additions of the other carbide forming elements make the steel resistant to softening on tempering. These steels can retain a hardness of over 400 Brinell after a tempering at 1100 deg. F., if they are first air cooled from about 1800 deg. F.

Recently a tool steel containing about 5 per cent chromium, 1.0 per cent carbon, 1.0 per cent molybdenum, and 0.60 per cent vanadium was introduced as a die steel which can be hardened by air cooling. This steel has excellent toughness at high hardness. The additional carbon has made it possible for the steel to attain a hardness over $R_c 60$. Because this steel does not require quenching for hardening, dies made from it can be hardened with a minimum of distortion.



FIG. 7—0.06 C, 15.9 Cr steel, air cooled from 1750 deg. F.; $R_c = 23$. Electrolytic etched with 10 per cent hydrochloric acid, and at 1000 diameters.



FIG. 8—0.07 C, 16.5 Cr, 1.7 Ni steel, air cooled from 1750 deg. F.; $R_c = 38$. Electrolytic etched with 10 per cent hydrochloric, and at 1000 diameters.

The next important steel in the series of chromium steels is the 0.40 per cent carbon, 9 per cent chromium, 3 per cent silicon steel which has been used for automobile exhaust valves for many years. This steel behaves like an ordinary hardenable material except that its critical temperature is up to about 1600 deg. F. The silicon has the functional effect of raising the temperature at which austenite forms and the specific effect of increasing the resistance of the steel to scaling at high temperatures.

Another steel with about 9 per cent chromium might be included here although it contains about 22 per cent nickel as well. This is Type 325 in the list of stainless steels in Table III, one of the first austenitic stainless steels developed in this country, and originally called Atha's 2600. The reaction rates of the austenite containing these percentages of chromium and nickel are so slow that it does not ever transform. This combination of chromium and nickel also confers appreciable corrosion resistant properties on the steel.

Steels with about 12 per cent chromium are made in a very wide range of carbon, from about 0.10 to about 2.25 per cent. The lowest carbon is the stainless iron, Types 403 and 410, which can be hardened to about R_c 40 in the usual way. The 0.35 per cent carbon steel is the old cutlery stainless, Type 420, discovered by Brearley, and by Haynes, and can be hardened to about R_c 55. The steels with 1.25 to 2.25 carbon are die steels, which can be hardened to about R_c 62 to 66. They usually also have additions of molybdenum, or vanadium, or both, and are used for their excellent wear resisting properties; they are not stainless, although they are more corrosion resistant than other tool steels. In these high carbon steels, chromium has only the functional effects of retarding austenite transformation and providing carbides.

If small additions of ferrite formers are added to the low carbon steel, it will not be all austenite at the heat treating temperature, but will consist of austenite plus ferrite. Under these circumstances, it will not be harden-

able to as great a degree, because at room temperature the steel will contain martensite and ferrite instead of all martensite. At the other extreme, if the high carbon material is heat treated at very high temperatures, say 2000 deg. F., or higher, it will retain an appreciable amount of austenite at room temperature because of the retardation of the austenite transformation rates due to the high austenitizing temperature, and its hardness as quenched may be only R_c 42, instead of R_c 66.

The next chromium level is about 16 to 18 per cent. Here again there are commercial steels of a wide carbon range, from about 0.10 per cent to about 1.00 per cent. The lower carbon is the stainless iron, Type 430, of high corrosion resistance. It forms only a slight amount of austenite at heat treating temperatures, and therefore is practically non-hardenable. The higher carbon steels are the improved stainless cutlery steel, Type 440, and others, which can be hardened to about R_c 56 to 60 by usual heat treatment.

When a small amount up to about

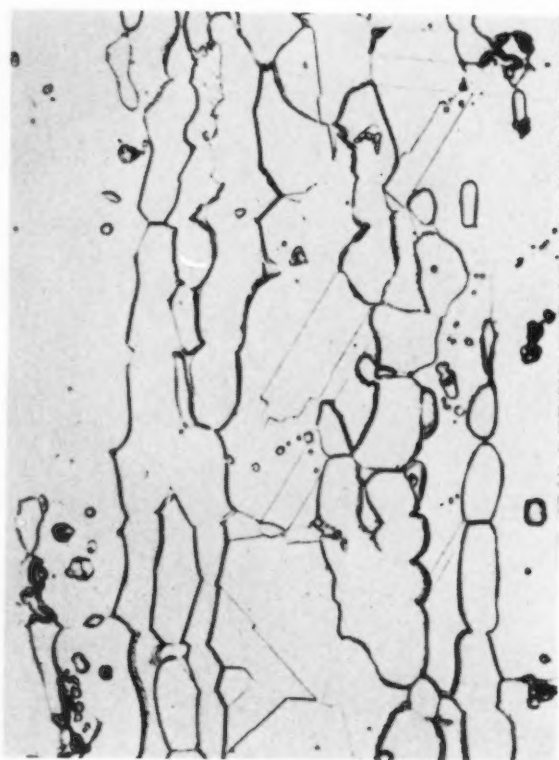


FIG. 9—0.11 C, 8.12 Ni, 19.64 Cr, 2.97 Mo steel, air-cooled from 1900 deg. F.; $R_B = 91$. Etched in Marble's reagent, and at 1000 diameters.

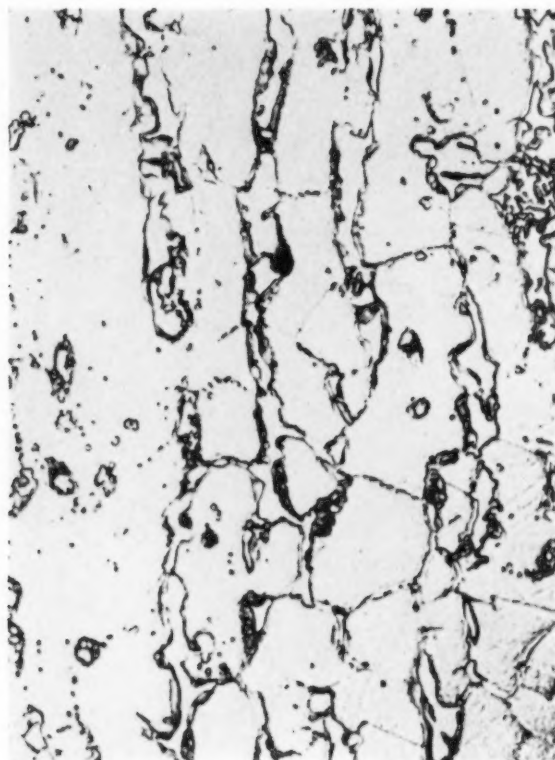


FIG. 10—Same steel as in Fig. 9, but reheated 16 hr. at 1600 deg. F.; $R_B = 97$. Etched in Marble's reagent, and at 1000 diameters.

2 per cent of nickel is added to the low carbon, 16 to 18 per cent chromium steel, appreciable amounts of austenite are formed at the heat treating temperature, and the steel, Type 431, becomes hardenable to about $R_c 38$ to $R_c 45$. The photomicrographs, Figs. 7 and 8, show a reversal of the behavior shown in Figs. 5 and 6. Here, the

structure of the steel with 0.06 per cent carbon and 15.9 per cent chromium as air cooled from 1750 deg. F. is mainly ferrite with a small amount of martensite, the hardness being $R_c 23$. The steel with 0.07 per cent carbon, and 16.5 per cent chromium, with an addition of 1.7 per cent nickel, as air cooled from 1750 deg. F., shows only

a small amount of ferrite, and a preponderance of martensite, with a hardness of $R_c 38$. The function of the nickel in this steel is to provide more austenite, retained at room temperature.

When more nickel is added, the transformation of the austenite is slowed up to such a degree that no transformation takes place down to room temperature. If the nickel is between about 3 and 6 per cent, the austenite, retained at room temperature, can be broken down by very low temperature treatments, or by long time tempering treatments at elevated temperatures. When the nickel is over about 6 per cent, the austenite is much more permanent, although it can be broken down by cold working to some degree if the nickel is under about 12 per cent. This combination of about 18 per cent chromium and 8 per cent nickel is the basis for the very popular series of corrosion resistant steels, Types 301, 302, 304, and 308.

The additions of titanium in Type 321, and columbium in Type 347, are made for the purpose of avoiding the formation of chromium carbides, and

TABLE II

Steel	C	Mn	Si	Mo	W	Cr	V	Co
Mushet (1870)	2.0-2.4	1.7-2.5	0.7-1.6	...	5.0-8.0	0.7-2.0	...	...
Sanderson MOSH (1898)	1.61	1.65	0.28	4.58	...	3.43	...	...
Rex AA	0.75	0.25	0.25	...	18.00	4.00	1.00	...
Rex Supervan	0.80	0.25	0.25	0.75	18.00	4.00	2.00	...
Rex Champion	0.80	0.25	0.25	...	14.00	4.00	2.00	...
Rex AAA	0.75	0.25	0.25	0.50	18.00	4.00	1.00	5.00
Rex 95	0.80	0.25	0.25	0.50	14.00	4.00	2.00	5.00
Rex TMo	0.80	0.25	0.25	8.75	1.50	3.75	1.10	...
Rex VM	0.85	0.25	0.25	8.00	...	4.00	2.00	...
Mix 1092	0.80	0.25	0.25	4.00	5.50	4.00	1.50	...
Peerless A	0.30	0.25	0.35	...	9.00	3.25	0.25	...
Peerless B	0.45	0.25	0.25	...	15.00	2.75	0.40	...
Peerless D	0.40	0.30	0.25	...	11.00	1.75	0.20	...
Halcomb CCS	0.40	0.25	1.10	...	4.25	5.25	0.40	...
Halcomb Halmo	0.55	0.25	1.15	5.25	...	4.75	0.50	...

of forming titanium, or columbium carbides, instead. These are practically insoluble in the austenite at ordinary annealing temperatures, and since they are not in solution, they cannot precipitate at grain boundaries during subsequent heatings in the range of carbide precipitation temperatures. Consequently, steels of this type containing adequate amounts of titanium or columbium are quite resistant to intergranular corrosion. The silicon addition in Type 302B is made to improve resistance to scaling at temperatures over about 1650 deg. F. The high nickel in Type 311 is usually combined with a silicon addition also, and this combination provides a stable austenitic steel of very high resistance to scaling. The additions of copper and molybdenum in Type 315, and of higher molybdenum in Types 316 and 317, are to provide improved resistance to corrosion.

If a sufficient amount of ferrite formers is added to the austenitic 18 per cent chromium, 8 per cent nickel steel, the ferrite phase is developed again. But now, at least when silicon, or molybdenum, is used to form the

TABLE III
Commercial Stainless Steels
(American Iron and Steel Institute Type Numbers)

Type No.	Carbon	Chromium	Nickel	Other Elements
502	0.10 max.	4.0- 6.0		
501	Over 0.10	4.0- 6.0		
325	0.25 max.	7.0-10.0	19.0-23.0	Cu 1.0-1.5
410	0.15 max.	10.0-14.0		Turbine Quality
403	0.15 max.	11.5-13.0		S or Se 0.07 min., Mo 0.60 max.
416	0.15 max.	12.0-14.0		
420	Over 0.15	12.0-14.0		S or Se 0.07 min., Mo 0.60 max.
420-F	Over 0.15	12.0-14.0		
430	0.12 max.	14.0-18.0		S or Se 0.07 min., Mo 0.60 max.
430-F	0.12 max.	14.0-18.0		
431	0.15 max.	14.0-18.0	2.0 max.	
440	Over 0.12	14.0-18.0		
301	0.09-0.20	16.0-18.0	7.0- 9.0	Mn 1.25 max.
315	0.15 max.	17.0-19.0	7.0- 9.5	Cu 1.0-1.5; Mo 1.0-1.5
304	0.08 max.	18.0-20.0	8.0-10.0	Mn-2.00 max.
302	0.08-0.20	18.0-20.0	8.0-10.0	Mn-1.25 max.
302-B	Over 0.08	18.0-20.0	8.0-10.0	Si 2.0-3.0; Mn 1.25 max.
303	0.20 max.	18.0-20.0	8.0-10.0	S or Se 0.07 min., Mo 0.60 max.
316	0.10 max.	16.0-18.0	14.0 max.	Mo-2.0-3.0
317	0.10 max.	18.0-20.0	14.0 max.	Mo-3.0-4.0
321	0.10 max.	17.0-20.0	7.0-10.0	Ti-min. 4XC
347	0.10 max.	17.0-20.0	8.0-12.0	Cb-min. 10XC
308	0.08 max.	19.0-22.0	10.0-12.0	
311	0.25 max.	19.0-21.0	24.0-26.0	
442	0.35 max.	18.0-23.0		
446	0.35 max.	23.0-30.0		
327	0.25 max.	25.0-30.0	3.0- 5.0	
329	0.10 max.	25.0-30.0	3.0- 5.0	Mo 1.0-1.5
309-S	0.08 max.	22.0-26.0	12.0-14.0	
309	0.20 max.	22.0-26.0	12.0-14.0	
310	0.25 max.	24.0-26.0	19.0-21.0	

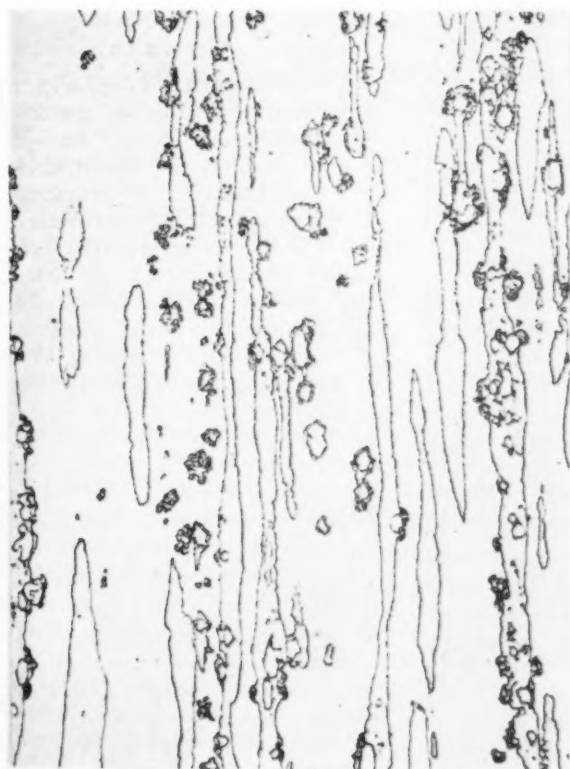


FIG. 11—0.40 C, 4.8 Ni, 24.5 Cr, 2.6 Mo steel, air cooled from 1800 deg. F.; $R_C = 18$. Etched in ferric chloride, and at 600 diameters.

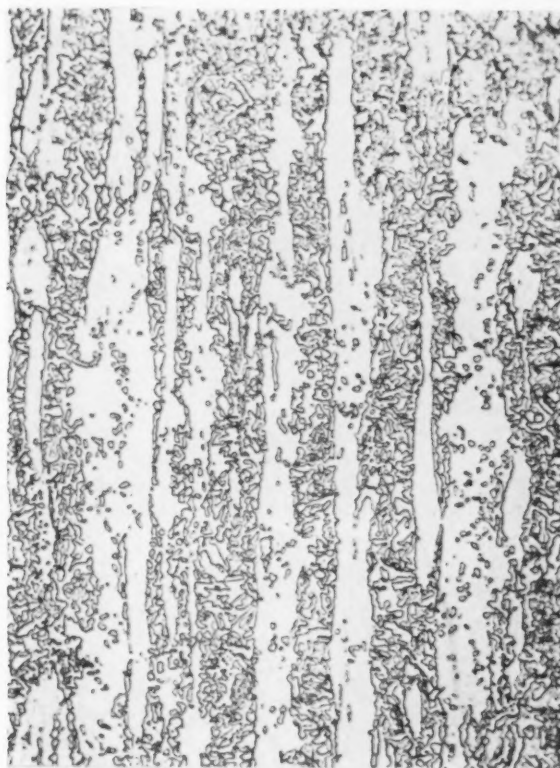


FIG. 12—Same steel as in Fig. 11, but reheated 16 hr. at 1400 deg. F.; $R_C = 45$. Electrolytic etched in oxalic acid, and at 600 diameters.

ferrite phase, it is the austenite which is stable at all temperatures, and the ferrite which is stable only at high temperatures, whereas with the lower alloy steels, the reverse was true. For when a steel showing austenite and ferrite, as in Fig. 9, is heated for a long time at temperatures between about 1200 deg. and 1600 deg. F., the ferrite changes to a brittle, non-magnetic phase as shown in Fig. 10, which has been positively identified as sigma phase, FeCr.

The highest chromium contents in commercial steels run around 22 to 27 per cent. The plain chromium steel, Type 446, usually runs under 0.25 per cent carbon, and forms only a slight amount of austenite at ordinary heat treating temperatures, and therefore cannot be hardened appreciably. As the carbon is increased, the ability of the steel to harden also increases. An important automotive exhaust valve steel contains about 0.75 per cent carbon and 20 per cent chromium together with additions of about 2.5 silicon and 1.5 nickel. This steel is completely austenitic at about 2000 deg. F. and transforms to martensite with a hardness of about R_c 40 to 45 when it is quenched. Another exhaust valve steel recently introduced has the analysis, about 1.00 per cent carbon and 25 per cent chromium. This steel can also be hardened in the usual manner to about R_c 45. Some experimental steels have been made with the same amount of chromium and about 2.00 per cent carbon and these can be hardened to around R_c 60.

When nickel is alloyed with these very high chromium steels, they also form more and more austenite as the nickel increases. The austenite formed is of the very sluggish type which does not transform even at room temperature. Type 327 with about 5 per cent nickel in addition to 25 per cent chromium has a structure which is a mixture of ferrite and austenite. It is not subject to grain growth at high temperatures, as is the plain chromium steel,

and is very much tougher. The addition of about 1.5 per cent molybdenum to this combination of chromium and nickel makes a steel, Type 329, which has excellent corrosion resistant properties.

One of the best steels ever developed for automotive engine exhaust valves is a steel containing about 25 per cent chromium, 5 per cent nickel, and 2.5 per cent molybdenum. When it is cooled from a temperature over about 1850 deg. F., this steel has a structure consisting of ferrite and austenite, as shown in Fig. 11. When the steel is reheated to about 1200 deg. to 1600 deg. F. for a fairly long time, the ferrite breaks down to sigma phase, FeCr and the austenite remains unchanged as shown in Fig. 12. This transformation of ferrite to sigma may also be brought about by first heating the steel to say 1900 deg. F., then cooling it to 1400 deg. F. and holding it at this temperature for some time. This transformation of high chromium ferrite to sigma is therefore similar to the well known transformation of low alloy austenite to ferrite and carbide. The sigma phase is quite hard, and since it is stable at temperatures up to about 1600 deg. F. (or higher depending on the composition), its presence prevents the steel from softening when it is exposed to the high temperatures of exhaust gases.

Other very high chromium steels, either plain, or with silicon or molybdenum, and with, or without nickel or manganese, have been found to contain sigma phase at temperatures below about 2000 deg. F., but these as yet have no commercial value.

As the nickel is increased in the 22 to 27 per cent chromium steels, the steels become completely austenitic and remain austenitic under most conditions. Type 309, with about 12 per cent nickel, and Type 310, with about 20 per cent nickel, are well known scale resistant steels for use at very high temperatures. Several different samples of Type 310 steel which had

been in service for very long periods at temperatures between 1400 and 1600 deg. F., were found to contain a constituent which apparently was not austenite, ferrite, carbide, or sigma. Its identity has not yet been established, but its discovery indicates that the so-called stable austenites may be broken down by very long time exposures to temperatures around 1500 deg. F.

The substitution of manganese for nickel as a stabilizer of high chromium austenites has been tried but has been found to be only moderately successful. Additions of small amounts of tungsten have been made to some of the chromium nickel austenites for improved strength at elevated temperatures, but these additions have been more popular in Europe and in Japan, than in this country. Additions of copper and aluminum have been made also both for improved resistance to corrosion and scaling, and for hardening by precipitation of intermetallic compounds, but steels with such additions have not attained commercial importance. Finally, a number of commercial high chromium and chromium nickel steels, Types 416, 420F, 430F, and 303, contain additions of sulphur or selenium, and some have also been made with lead additions, for the purpose of making the steels easier to machine.

Conclusion

The development of high alloy steels has been a fascinating game. The search will go on for new steels which will do a job at a lower cost, or which will do a better job at the same cost. It is very probable that some new steels will be discovered by accident as has been the case in the past. But there is now good reason to believe that, with improving knowledge available of the effects of alloying elements on the formation and transformation behavior of austenite, the cut and try method of alloy steel development will rapidly give way to a true scientific synthesis of the best steel for every job.

FACING BRAKE PISTONS 3000 PER HR.

By HERBERT CHASE

HYDRAULIC brake pistons are produced by the Doehler Die Casting Co. in lots of several million a year. The die casting is carried out in multiple-cavity dies, using aluminum alloy, and, of course, it is necessary that provision be made for rapid machining.

One size of piston is $1\frac{1}{4}$ in. in diameter and $\frac{3}{4}$ in. high. The castings are hollow and flash occurs at one end. This flash is faced off in the dial fixture here illustrated (upper photo) at the rate of no less than 3000 pieces per hr. This work is done in a special drill press fitted with a table which carries a gear driven dial. The latter is given an intermittent motion and is synchronized with an automatic hydraulic feed of the spindle of the press. An end mill, piloted in an extension above the dial, is mounted on the spindle and faces each piston when it reaches a position under the mill. The dial is at rest, of course, while the facing is being done.

As the upper illustration shows, the dial has a dozen recesses or clearance holes in which the pistons are inserted by hand, with the end containing the flash uppermost. Between each pair of recesses there is a wide slot, and a narrow radial slot runs from each recess to the periphery of the dial. When a piston reaches the position in which it is to be faced, a spring loaded wedge enters the wide slot next to the recess containing it. The wedge springs the narrow section of the dial, against which it bears and, by contracting the recess, clamps the piston securely just before the end mill

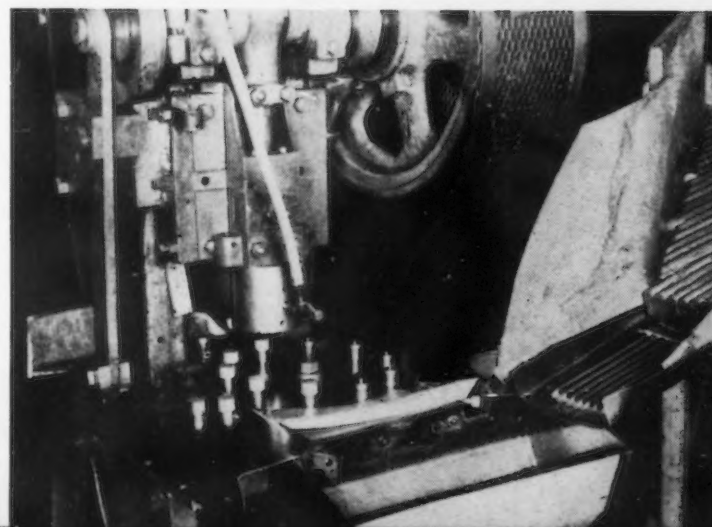
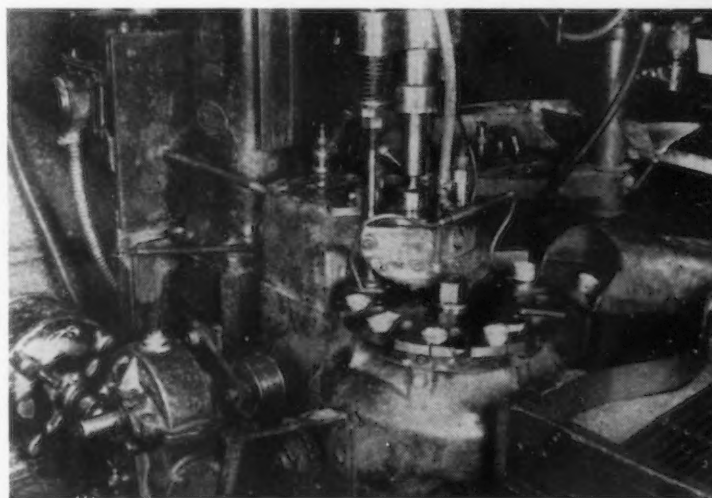
reaches and faces the piston end and cuts away the flash. Then the spindle and mill, as well as the wedge, are lifted automatically and the dial indexes to bring the next piston under the spindle. As this occurs, a timed blast of air blows away the chips resulting from the cut.

After machining, the pistons continue to the unloading position, which is opposite a chute. There an air ejector automatically blows the piston out of the recess and into a chute, leaving the recess free for reloading. Pistons to be machined reach the operator via the trough at the right and all he need do is to load the castings into the recesses, as they come to the loading position, and to gage an occasional piece to make sure that required dimensions are being maintained.

Pistons are cast, of course, with a slight draft on the cylindrical surface. This draft has to be removed. The operation is carried

out in a punch press (lower photo) in which the ram carries a hollow punch with a hole slightly smaller than the piston. On each down stroke of the punch a piston is forced through the hole and is sized by a burnishing action which makes the cylindrical surface straight and gives it a smooth surface. The diameter is held within plus or minus 0.0005-in. limits in this operation. As the punch is lifted, it carries the piston with it, and the piston is ejected through a hole in the back of the punch or its holder and falls into a chute.

To feed the pistons into correct position to be forced through the burnishing tool, the bed of the press is fitted with a dial which is given a positive intermittent motion, and stops each time a piston comes under the center of the ram. All the operator has to do is to load the dial at a point well away from the ram. Pistons reach the operator from the chute at the right which keeps the trough in front of the bed of the press filled. There are no chips, since the burnishing does not remove any metal from the pistons, and the latter are ready for final sizing in a centerless grinder as soon as they are burnished. About 2700 pistons an hr. are burnished in this setup.



WELDING OF HEATING

SKILLFUL engineering of a new consumer product to arrive at sound construction within workable price limits, is exemplified in the fabrication of the Waterfilm heating boiler, by L. O. Koven & Brother, Jersey City, N. J. Early models of this boiler demonstrated that its operating principle could expect a favorable reception in the home owners' market, but manufacturing costs were high. Therefore the engineering staff turned its attention to modifications of design details which would eliminate some of

the more costly operations and make it possible to fabricate the boilers in production lots at a cost which would make the item commercially competitive.

As a production item the boiler must make its way through a huge plant along with innumerable other fabrications of widely varying size and character, some of which are repetitive but many of them made to special design. Originally a small range boiler factory, the Koven plant has expanded steadily through more than a half-century and now serves as a fabricator of equipment for processing industries, food industries, machinery builders, utilities and many others. Facilities include a five-story machine shop, sheet metal shop, plate and boiler shop, pressed steel shop, galvanizing plant and welding shop. Products, other than all manner of tanks and pipe assemblies, range from a candy dipping table to exhaust manifolds for diesel engines.

The Waterfilm boiler is a stabilized flash boiler of welded steel construction. Its method of functioning is due to the placement of several steel "generators" directly over the combustion chamber (Fig. 1). These generators hold a $\frac{3}{4}$ -in. film of water directly over the heat source, and being of zig-zag construction they present a large amount of heating surface, resulting in a quick heating of an estimated 15 per cent of the water in the boiler. The construction also causes the flames to be baffled back and forth between the generators and to strike the heating sources at right angles. The essential features of the boiler therefore made

necessary the fabrication of a somewhat complex and difficult part.

When the service records of the first of these boilers demonstrated the soundness of the operating principle and the Koven engineering staff began its study of the fabrication method, the following important points were to be considered:

- 1—The finished boiler must meet the requirements of insurance companies and other regulatory bodies.
- 2—Fully to develop the functional advantages of the design principle, welded steel construction was indicated.
- 3—For economy it was desirable to use the least possible amount of welding.
- 4—It was further necessary to provide a desirable range of sizes and capacities without unduly complicating assembly procedures.

Koven officials now consider that the evolution of a production method for this complex steel structure has reached at least the "satisfactory" stage. And the author believes that the details which follow will sufficiently reflect the engineering staff's work to obviate the necessity for comparison with earlier procedures.

Components of Boiler

The fabrication of a rectangular No. 3 Waterfilm boiler, a popular size which contains three generators, will be taken as an example. Disregarding the sheet metal exterior jacket, which is merely a cover, this boiler has two principal parts: the water-jacket and the generators. It has been found most economical to fabricate the water-jackets in lots of 50. Generators, which are of one size for all models, are made up of stampings, delivered ready for assembly in lots of 1000 and welded for stock independently of other fabrication (Fig. 2).

Referring to the water-jacket construction, this consists of an inside box and an outside box, welded together and staybolted. The front and sides of the inside box are all one piece of

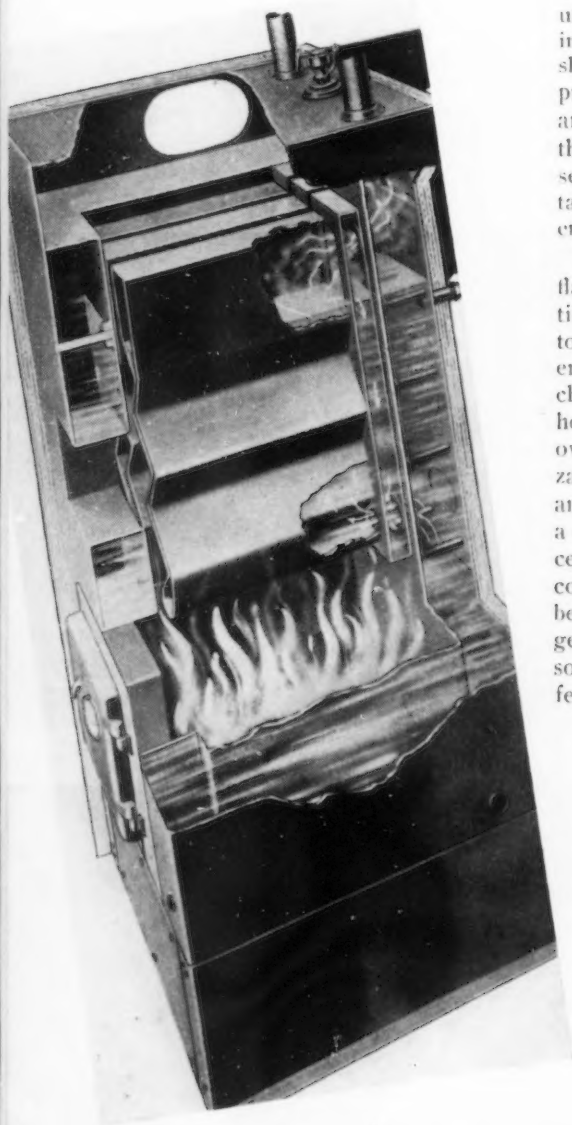


FIG. 1—Cut-away view of Waterfilm all-welded house heating boiler. The two principal components are the water jacket and the generators, the latter located directly over the combustion chamber.

BOILERS



By H. S. CARD

Mass Production Principles, with Lowering of Costs, Made Possible by Redesign of Boiler Details

plate ($\frac{1}{4}$ -in. firebox steel is used throughout) in which there are six bends (Fig. 3). The back plate has one bend, sloping it back slightly from the firebox at the bottom. Thus the inside box, including flanges along the tops and bottoms of the side plates, is virtually made of two pieces.

Likewise, the front and sides of the outside box are formed from a single plate, and the back and top from another plate, each of these pieces requiring two right-angle bends (Fig. 4). The inner wall for the fire-door and two inner bottom plates, plus a rectangular top filler plate (all of them simple cuts) complete the material requirement for the structural portion of the boiler.

Shaping and Forming

It proves economical to order plates for the larger pieces sheared to approximate size at the mill, with an allowance for squaring. These blanks are laid out with metal templates which give the squaring size. Centers of all punched holes, corners of all torch-cut holes, and all bending lines are marked out by a layout man. The blank is then squared on a 10-ft. Niagara power shear.

The next series of operations excellently illustrates why welding fabricators speak of the power press brake as an invaluable tool. Here a 6-ft. Cincinnati press brake (Fig. 5) takes care of all punching and bending operations needed on the boiler. All round and oval holes are punched in the flat. The toolroom shop has made up special dies for multiple punching and fixtures for locating the work so that the operator can feed the blank forward for successive rows of holes without worrying about accuracy. Almost perfect alignment is particularly essential on the large holes for the generator openings,

and this is automatically provided for in the construction of the punching dies. Holes of one size are punched in rows, but the oval handholes for access to the generator connections are punched singly.

Since staybolts are needed on all four sides of the boiler, several devices have been adopted to conserve the time required for setting them. One row is entirely eliminated by carrying the back plate across the full width of the boiler, since this plate is located right where staybolts would otherwise be placed. Further time saving is accomplished by using a special blade for shearing them to size, which does not deform the ends, so that they slide into position easily. The blade is notched to the contour of the staybolt, which is held in a grooved block that prevents distortion.

An ingenious method is in use for setting staybolts in the inside back sheet, where the flat manifold of the

generator is placed against the back inner wall. A three-piece die is used for punching the staybolt holes on this surface. It consists of a tapered hollow die with an inside piece of the correct size for punching the hole. This punch rests on a removable solid block. The combination operates as follows: (1) the staybolt hole is punched, (2) the supporting block is removed, allowing the punching die to drop to the level of the tapered portion, (3) the second stroke forms a depression in the plate. The staybolt can then be welded in position without projecting beyond the inner surface (Fig. 6). Probably the next best solution of this problem would be to weld a threaded spud on the reverse side and thread one end of the staybolt to fit it.

After all punching is completed, the bends are made, as a rule in lots of 50 plates. It is obvious that substantial economies are realized by centering

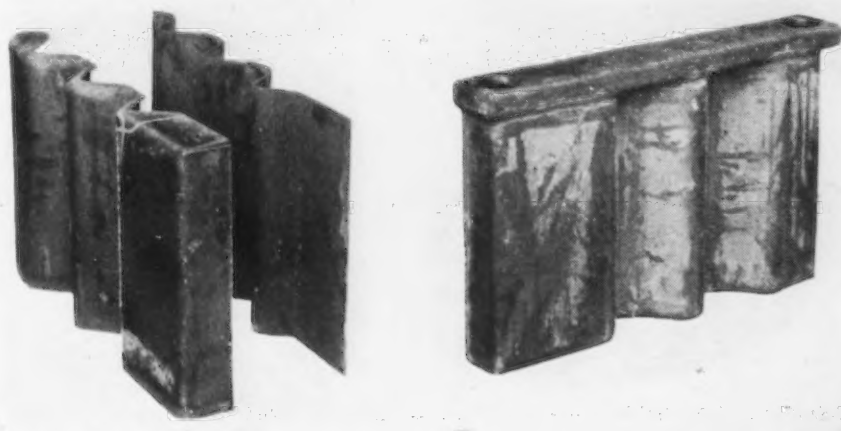


FIG. 2—The steel generators, one size for all models, are made up of a front and a back stamping (at left) welded to a sheet steel manifold as shown at right.

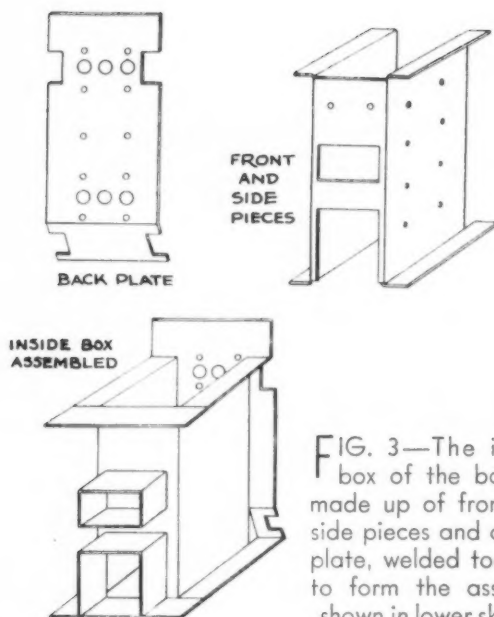


FIG. 3—The inside box of the boiler is made up of front and side pieces and a back plate, welded together to form the assembly shown in lower sketch.

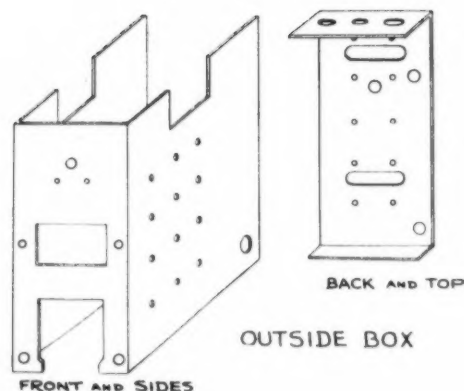


FIG. 4—The two parts of the outside box after punching and forming operations. The inner box is welded in place inside this shell, and welded staybolt construction is employed where the two boxes form the water jacket of the boiler.

such a large number of operations about one machine.

Several of the component parts of the boiler have rectangular holes and notches. These are marked on the plate by the layout man and are flame cut by hand after all forming has been

done. Then the edges are cleaned up and assembly starts.

Welding Sequence

All welding on the boiler is by qualified operators, who follow approved techniques for this class of work. One-

quarter inch coated electrodes are used, with from 280 to 300 amp.

The first welding operation is the assembly of the inner back plate to the front and side piece, to form the inner box. Because these are the only welds that are not accessible from the outside, they are welded from both sides. All other welding is on one side only. The U-shaped jacket comprising the front and sides of the outside box is then tacked to the inner box assembly. Next the firedoor wall, inner bottom plates and top and back plates are tacked in position. Staybolts are inserted and welded, then the outside seams are welded, spuds, angle brackets, etc., are applied, and the boiler is ready to receive the generators.

Construction of Generators

Fabrication of the generator sections (Fig. 2) is a well engineered procedure. Since these parts are relatively small and easily stored, they are

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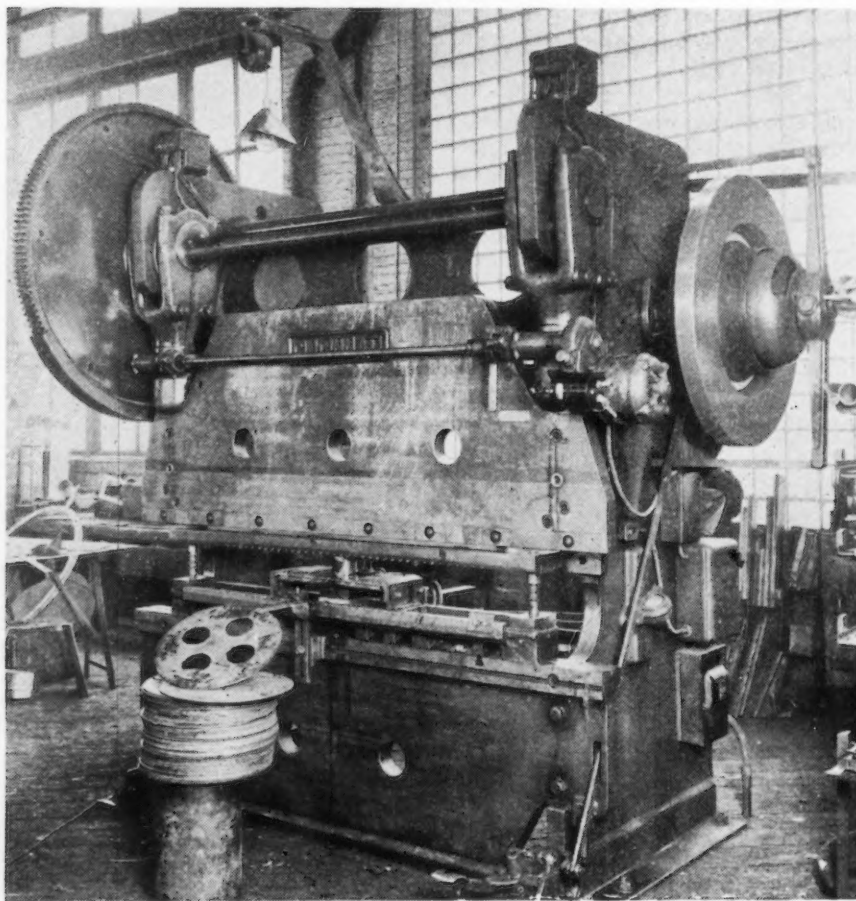


FIG. 5—All punching and bending of the inside and outside box components that form the water jacket of the welded boiler are done on this 6-ft. Cincinnati press brake equipped with special dies and work locating fixtures. The machine is also used for work on parts of other Koven products, such as punching of the disks here shown.

made up in large quantities at times when experienced welders are available. The stock is 5/32-in. flange steel. The manifold stamping is flanged inward at the inlet and outlet openings when delivered. These flanges are first tapped on a radial drill press to receive the connection bushings. The assembly jig has two spuds, threaded to engage the manifold and bring it tightly against the bed of the jig. The two side stampings are inserted and wedged tightly in place, then the whole is tack welded. After tacking, the generators are removed from the jig, and can be taken to any convenient location for final welding; i.e., wherever in the shop there may be welders who are not assigned to other work. Before going into stock each generator is tested independently.

The finished generators are attached to the boiler with bronze screw bushings which hold the generators snugly against the shell plate. A pneumatic jack is used in this assembly. Being attached to the shell at one end only, they are not subject to leaks from expansion and contraction stresses. Seal-

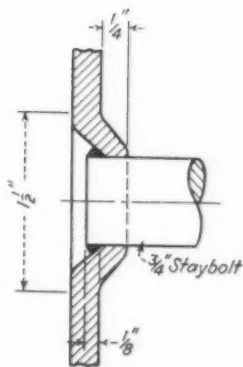


FIG. 6—Detail of staybolt weld in the inside back sheet. The staybolt does not project beyond the inner surface of the sheet.

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ing is by corrugated copper asbestos gaskets, so the threads are not at all depended upon for water tightness. This is the last operation before testing. Each boiler is given a 60-lb. hydrostatic test.

A two-fold advantage is derived from the careful engineering which has been applied to this production method. First, the simplification of design and procedures has greatly conserved time and materials and possible trouble in service. Secondly, large lots can be put in production on short notice and with practically no disturbance to other work which may be going through the shops at the same time. Furthermore, large production is possible without additional equipment other than a few jigs and dies, so there is no large, expensive machinery standing idle during the off season for boilers.

Other operating short-cuts have been found in fabricating other items in this line of boilers. A small boiler is made, of a modified round type, to meet the needs of the low-priced home, and the line includes a sectional series of large size heating boilers which can be taken through a 2-ft. opening and assembled by means of push nipples. Fabrication of each unit in the line has been engineered in the same manner as just described.

SELF-LUBRICATING WIRE

A POSSIBILITY of producing wire with a surface-impregnation of dry lubricant for use in such applications where lubricant will prevent binding, sticking, and wear, is forecast as the result of a recent discovery, according to Acheson Colloids Corp., Port Huron, Mich.

Peculiarly enough, the discovery was made in connection with the production of wire in which the presence of such a lubricating surface was actually undesirable.

For some years one practice has been to use colloidal graphite as a lubricant for the drawing of fine wire such as is used for tungsten filaments. Such wire comes out of the dies dark in color due to the presence of particles of colloidal graphite.

In attempting to apply the same principle of drawing-die lubrication in stainless steel wire, however, it was discovered that the graphitic coating could not be removed by normal methods such as washing. Investigation disclosed that the movement of the wire through the drawing dies and the pressures involved in its passage through the dies had created what is known as a "graphoid" surface on the wire. That is, the extremely fine colloidal graphite particles had been intimately combined with the metal in the surface of the wire.

This is the same condition as is encountered after a period of time in machinery lubricated with colloidal graphite suspended in oils—a desirable

attribute, since the "graphoid" surface here provides a good degree of dry lubrication and reduces tendency toward sticking even in the absence of other lubricants.

An additional advantage of wire drawn with colloidal graphite "lubricated" dies may be in a certain amount of natural resistance to corrosion which may be imparted by the graphoid surface. In the case of stainless steel wire this characteristic of course was of little value. It may offer possibilities however in the direction of reducing costs in the production of wire requiring some amount of protection against corrosion, since it may eliminate the necessity of an additional operation to provide corrosion resistance.

PRODUCTION CONTROL

MORE THAN ONE ITEM ON AN ORDER: The majority of orders received are for more than one item. Of course each item will have to be scheduled separately. However, if one of the items must be produced on a machine that is congested with work, the date of completion of that item should determine the date for all of the other items on the order. In other words, the item on an order that will be received by the packing department last should be placed on the schedule chart first. Then the other item should be scheduled working backwards on the chart from the completion date of the most delayed item.

There is no use completing the other items ahead of the long delivery item unless, of course, the equipment for producing the other items runs out of orders, in which case it would be advisable to complete these other items ahead of schedule so the equipment will be available for emergency items as previously explained. In this way a large number of part shipments will be eliminated.

The same suggestion also applies to the case where there is no congestion on any of the equipment but there is one large item (requiring considerable time to produce) on the same order with a number of small items. The long production item obviously should be scheduled first.

MORE THAN ONE OPERATION ON THE SAME ITEM: Where a single item on an order requires more than one piece of equipment to complete it, of course it must be scheduled in the order of the operations. This does not mean that every part requiring two or more operations must be scheduled in this manner. Where both operations are performed on the same machine (even though different setups are required) the total time necessary for both operations can be scheduled as one order. But where different equipment is involved, care must be taken to schedule the start of the second operation a sufficient length of time after the first starts so there will be a continuous supply of parts at all times for the second operation. This

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need not necessarily mean that the start of the second operation should be scheduled after the first operation is entirely completed for the whole lot. But where the second operation is faster than the first, care must be taken so the press will not run out of parts from the first operation; otherwise an additional press set-up might be required.

DUPLICATE EQUIPMENT: For some of the orders going through the plant there is a choice of more than one machine that the order can be run on. In case the machines are exactly duplicate, that is to say any order that can be produced on one can also be produced on one or more like machines, then the work for these pieces of equipment should be scheduled as a group and not to individual machines. In other words, a single line on the chart will represent the entire group of machines, and the capacity possible in a day will be the combined capacity of all the machines in the group.

However, a further complication arises when certain orders are adaptable to any one of a group of machines and each of the machines has certain other orders that can be run only on that particular machine. In these cases the orders applying to the specific machine should be scheduled first; then a proportionate amount of the group machine time should be set aside for each of the machines. For example, if there are three machines ahead that can be run only on that particular machine, then the group work should be divided one-third between each machine. On the other hand, if one machine is scheduled up with work adaptable only to it far ahead of the other two machines in the group, then the group work should be divided between the other two machines so that the total work on all

three machines will be completed at about the same time.

SHORT ORDERS: Schedules should not be attempted more exacting than in days. That is, no attempt should be made to forecast that an order will be completed at 11.00 a.m. and another at 3.00 p.m. If you know what day they will be completed, that will usually be sufficient.

Consequently, on equipment used for short orders where a number of orders are run in one day, it may be found advisable not to try to put the order numbers on the chart. Notation can simply be made on the chart of "Schedule A," for example. Then a list on a separate sheet will show the order numbers applying to that particular schedule.

STOCK REPLENISHING ORDERS: In the majority of plants orders for replenishing stock will be scheduled on different equipment than special orders. However, where stock replenishment orders and special orders are made on the same machine, preference in scheduling should, of course, be given to the special orders. Care should naturally be taken to see that the warehouse is not entirely out of the size called for by the stock replenishment order and that shipments are not being held up on account of it. If this were the case, the stock replenishment order should be scheduled as a special order. Some suffix to the order number shown on the chart should be used such as "x" to indicate its status as a special order.

PREPARATION DEPARTMENTS: Scheduled dates should be determined for the preparation departments, such as the tool department, raw material department, etc. Gantt charts (see sample last week) should be drawn up for these departments in the same manner. This will enable the tool store-room to get out and condition the tools ready for the next day's production. If the tool department is to work one day ahead, then one day previous to when production begins in the shop should be the date used by the tool department.

Material departments should be han-

-HOW TO KEEP DELIVERY PROMISES

dled in the same way. In scheduling work for the raw material department on a chart, particularly for such work as requires some time to prepare material, one should work backwards from the production department schedule. With the quantity of material known, the length of time necessary to prepare it can be charted, giving the date when the work on the material must be started.

MEN AND MATERIAL: All scheduling in the production department must of course take into consideration men and material. Naturally, a plant cannot schedule more work to be done in a day than the number of men on the payroll can do regardless of whether the equipment is available or not. The effect of working overtime or two shifts of course just extends the capacity of each piece of equipment in the plant. More work can be scheduled within a given day—in other words the line indicating the time allotted for each order would be shortened. Here again the charts will show immediately the amount shipments could be expedited by working overtime.

Moreover, work cannot be scheduled, particularly for large orders, if there is not sufficient raw material on hand. However, this is more a question of inventory control rather production control, and when the inventory control system is functioning properly, ample warnings of material shortages will be available.

When it is necessary to order special material for an order, obviously production cannot be started until the material is received. However, a line on the chart should be devoted to material on order and the date promised indicated. Thus, such cases will be treated more or less as the first operation on a part, the second operation being the actual machine operation in the plant. Consequently, this can be scheduled for the equipment at the first time the machine is available after the date the material is promised.

The same applies to orders for which new tools must be made up. A definite promise for the tools should

WITHOUT production control it is difficult to fulfill delivery promises and book new business in such a manner as to secure maximum profits. Last week the author described the necessity and advantage of production control, even for small plants, and introduced the Gantt chart to facilitate such control. Herein, in conclusion, other factors that can be handled by the chart are discussed, and complete data are given regarding the use of the chart for a particular department.

be obtained from the tool shop and production on the machine scheduled for the earliest date the equipment is available after the completion date promised for the tools. The tool shop itself should of course have its work scheduled on charts.

ASSEMBLY, PACKING, AND SHIPPING: Since the product cannot be shipped immediately after production is completed on the machine, actual shipping dates must be promised as many days after production is completed as experience indicates is currently necessary for the goods to get through the assembly, inspection, packing, and shipping. As has already been indicated single lines will be allotted to these departments to show total loads or as many lines allotted as are necessary to keep track of equipment for specialized use.

First Considerations

In order to schedule a particular order as just indicated, it is first necessary to know what piece of equipment in the plant the item is going to be run on. It is also necessary to calculate the length of time necessary to run the item on the equipment specified.

Standard blank Gantt charts can be purchased from stationery supply houses. However, after putting them to use for a while and developing some experience with them, it will probably be found economical to have the forms printed up special because equipment numbers and other recurring information can be included in the printing.

Use of Chart

As an explanation of the Gantt chart illustrated for a stamping department on Dec. 18, 1939 (see first section, last week), consider the following:

Press 53—Schedules for presses 53, 55, 56, 1061, 1063 and 1064 run off the chart indicating the presses are loaded up beyond the two weeks' period shown by the chart. The notation at the right hand margin shows how far ahead these presses are loaded. The actual time required and the sequence of the jobs involved would be shown on charts for the following two weeks' period. Many of these jobs are second and third operations and of course must be scheduled for some time after the preceding operation is started. In order to prevent additional set-ups of the press, the subsequent operations must be scheduled so as never to run out of parts from the preceding operations.

Obviously, no order should be promised for any of these presses until the date shown at the right-hand margin, unless it is intended to take some of the orders out of their present schedule. In this case it can be seen just what orders are involved and how important they are.

Press 54—Note that presses 54 and 37 have no work scheduled for them. Consequently, any work to be made on these presses could be promised for immediate delivery—that is the job could be started on immediately.

Press 56—Press 56 has nothing scheduled until the middle of Tuesday, Dec. 19. The second operation of order 7332 cannot be started upon until that time because there will not

be parts available from the first operation on press 1063 until that time.

Press 30—Orders for presses P-15, 30, 38, 39, 57 and 1062 can be promised for starting in work on the day where the line on the chart stops, showing these presses are not loaded beyond this point.

WORK NOT SCHEDULED—In addition to the work indicated by the chart there is the following work for various presses not yet scheduled:

Press No. 30—22	hr.
Press No. 38—3	hr.
Press No. 53—9	hr.
Press No. 55—94½	hr.
Press No. 57—10	hr.
Press No. 58—24	hr.
Press No. 59—20	hr.

It is not possible to schedule this work for any definite time at present because work is held up for some reason such as waiting on material, tools, approval of samples, etc.

With a well-established production control system definite promises should be obtained from the tool room concerning the completion of the tools. Moreover, the purchasing department should obtain delivery promises from

the suppliers as to the date special material will be shipped. With this information the jobs could be definitely scheduled. A job being held for approval of samples or the like could not be definitely scheduled except that the customer could be informed the job would be started on a particular date provided samples were approved by that time.

GENERAL: The chart illustrated is based upon working overtime into February. If it is decided later not to run overtime, then all lines will be lengthened accordingly. The chart also brings out the fact that it is not necessary to work overtime on those presses not crowded with work, such as presses No. P-15, 30, 37, 38, 39, 54, 57 and 1062.

The chart further shows clearly the necessity of knowing what schedule the plant is going to operate on for a considerable time in the future. Obviously adequate planning cannot be done without this information.

Moreover, the chart emphasizes the desirability of setting tools in order after hours to expedite service to customers and increase the capacity of the equipment. For example, the work

on several of the presses extends over to the next day for only about an hour. If this work could be run overtime for an extra hour to finish it up and then set tools after hours so the press would be ready to run the next morning, about a half a day of press capacity would be gained.

All of the jobs begin on the chart without a starting bracket (┌). This indicates these jobs were on the press on Monday morning, Dec. 18. There was work still to be done on these jobs as pictured by the length of the lines. Daily checks of the chart should be made by the production manager and heavy lines drawn in under the lines, the heavy lines showing actual performance as compared to the predicted schedule. If the heavy line does not come up to the date when the chart is checked, then production is behind schedule. If the heavy line goes beyond the date of checking, then production is ahead of schedule.

Arrows at the end of the week show the job carries over to the next week or over to the next sheet covering the following two weeks.

In order for this to be usable in the office a guide would have to be prepared covering in general what type of stamping work is adapted for each press. However, this would only be a general guide, and in order to make certain, particularly in special cases, the shop would have to be checked to determine what press would be used for a specific job. A little experience with this, nevertheless, will permit the office to go a long way in determining press equipment for use on a specific job.

The heavy line at the top of the chart shows the total load on the stamping department. This indicates the time that would be required for all the work if each press were adaptable equally to all jobs. At the time the chart was made up this composite line runs off the two weeks chart. As business drops off and less work is ahead this line would decrease in length; its end would then be on the two weeks chart. If business increases the length of this line can be expected to increase. Consequently the length of this line compared from chart to chart gives a general idea of the activity of the stamping department.

A considerable number of the presses on the accompanying chart are scheduled beyond the time covered by the chart. It may be desirable in such a case to reproduce the chart for the following two weeks for general distribution or in fact to distribute both of them.

ALL production scheduling must take material into consideration. Inventory control must mesh with production control to avoid material shortages and consequent halts in the orderly flow of production to meet delivery promises.



ARCHITECTURAL PORCELAIN ENAMEL

IN the past few years sizable strides have been made in the improvement of architectural porcelain enamel for building purposes. Although the use of porcelain enamel in architecture was actively introduced about 10 years ago, the many possibilities of this unusual material have only recently begun to be thoroughly appreciated. From its early use as a metal roofing tile and other limited building applications, porcelain enamel has now been developed to a point where literally tens of thousands of stores, service stations, and other types of buildings have been successfully and attractively finished in this durable, colorful material.

Another recent development of the use of porcelain enamel as a building material is its application for interior finishing. The Chicago Vitreous Enamel Product Co., Cicero, Ill., has been one of the leading exponents of porcelain enamel as a building material, its first demonstration of the efficiency of this material being the installation of approximately 13,000 sq. ft. of porcelain enamel in research and testing laboratories, erected during 1936. At that time porcelain enamel was used for walls, ceilings, doors, and many other applications.

This same company, in completing extensive alterations to its executive and general offices, has made further and even more elaborate use of architectural porcelain enamel. In contrast, however, to the type of construction employed in the laboratories, the latest method of handling provides a clean, unbroken surface of porcelain enamel without the use of attachment strips or other earlier methods of fastening panels to walls and ceilings. Formerly, the porcelain enameled wall panels were made of comparatively light gage metal without flanges on those edges covered by attachment strips. These panels were backed up with insulation board, this process being adopted to insure an insulated, flat unit. Now the panels employ no attachment strips, the flanges of the panels being slotted and hung to furring strips by means of concealed hooks. The panels are fabricated from 18 gage metal to which an insulation board is veneered under high pressure backed up with a sheet of light gage galvanized metal, thus making a flat, rigid building unit.

The new reception room, shown here, is an excellent example of how the liberal use of architectural porcelain, used in combination with other materials, can create an extremely pleasing effect. The receptionist's compartment has a waist-high base finished with shining black porcelain enamel, and is topped with clear glass panels set in bronze. The compartment sets against a back wall of calfskin brown porcelain enamel which blends well with the ivory porcelain enameled panels on either side. On this same elevation, entry doors and windows of bronze fitted with molded glass provide adequate lighting for a corridor behind, but the molded glass prevents clear vision, thus insuring privacy.

The floor of this reception room is terrazzo with bronze detail insets, its color being in harmony with the other colors of the room. Several ceiling-high mirrors divided by porcelain enameled pilasters create an impression of additional spaciousness. The balance of the wall area is finished in clean maple green porcelain enamel. Incorporated on each wall is a mural, shown here, permanently fired into the porcelain enamel finish. One of these murals carries out the research motif, the other typifying the numerous manufacturing operations involved in the production of porcelain enamel. Each wall section has panels fabricated to form a compound curve and furniture has been fitted to this contour.



WHAT'S NEW IN INDUSTRIAL

SINCE its introduction a year ago, great strides have been made in the application of fluorescent lighting to industrial plants and there has been constant development in fixtures and accessories for this type of lighting. Concurrent advances have also been made in reflector fixtures for high intensity incandescent lamps, and more fixtures have been designed for specific purposes, such as the lighting of stock bins. This review covers some of the more recent developments.

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MANY makers of industrial lighting equipment have announced new types of fluorescent lamp fixtures within the past few months. But what has focused attention on this method of illumination is the adoption of fluorescent lighting



throughout the new windowless, air conditioned plant of the Allison Division of General Motors in Indianapolis, duplicating midday north light 24 hours a day. Each lighting unit is equipped with three 40-watt tubes, 48 in. long, and was supplied by *Westinghouse*. The use of such lamps cuts down the amount of cooling to be supplied in summer to overcome lamp losses, because the fluorescent lamp is a "cold" light, being many times more efficient than the incandescent lamp.

AS will be seen later, the 48 in., 40-watt size is practically the standard industrial unit, although larger sizes are made. Beginning May 1, for instance, *Westinghouse* will place on the market a new 85-watt, 58-in. type RF fluorescent lamp producing white light, more closely approximating daylight than the present blue-white type RF lamp of the same length and wattage. Color produced by the white lamp is somewhat like that of the daylight Mazda fluorescent lamp and is suitable for a wide variety of industrial uses, including those where color discrimination is important. Light output is 4250 lumens and the rated average laboratory life is 3000 hours. This lamp may be operated on either 110 or 220 volt, 60 cycle a.c. in special equipment which provides d.c. through the use of a rectifying device. The new white and blue-white lamps are interchangeable in single and twin fixture units. Lamp is shown at left.

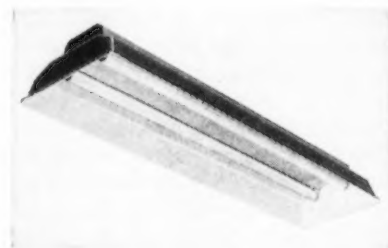
High Wattage Units

ASIMILAR 58-in. tube is being introduced on May 1 by *General Electric Co.*, Nela Park, Cleveland, in white as well as in the original blue-white. A two tube RF fluorescent luminaire has also been developed

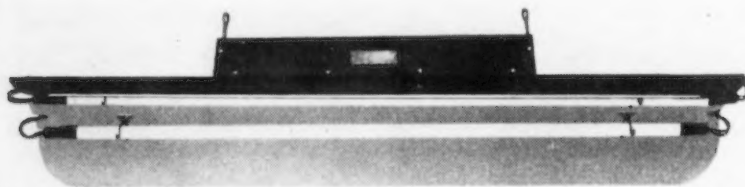
by G. E. especially for lighting industrial areas. The fixture illustrated consists of a self-contained auxiliary mounted on a porcelain enamel reflector. It is rated at 200 watts and operates two of the new 85-watt lamps which have a combined initial rating of over 8000 lumens. When mounted on 10-ft. centers, according to Nela engineers, this unit will provide more light from a lesser number of tubes than other available equipment.

RLM Fluorescent Units

THE *RLM Standards Institute* of Chicago has announced the establishment of an RLM specification for a new 48-in. fluorescent twin lamp porcelain enamel unit. A porcelain enamel reflecting surface is used for diffusion durability; minimum light



output efficiency is set at 78 per cent; cut-off angle is $72\frac{1}{2}$ deg. and closed ends are used to eliminate glare; the two 48-in. Mazda fluorescent lamps are correctly spaced to insure a comfortable and efficient light; auxiliary equipment is included to correct for power factor and minimize flicker, and the renewable starting switches are located in the socket to facilitate inspection and maintenance. The *Westinghouse Electric & Mfg. Co.* has introduced a lamp standard conforming to these specifications under



INDUSTRIAL LIGHTING EQUIPMENT

the designation of RLM fluorescent luminaire. The units are furnished complete with hood, reflector, lamp holder, lamp starter and ballast equipment for 110-125, 199-216 and 220-250-volt circuits. The hood as illustrated is sheet steel, hinged to the reflector with knockouts at each end for end-to-end mounting. Units are arranged for rigid conduit, flexible conduit or chain suspension mounting.

THE new Stream-Liter twin lamp fluorescent fixture for 48-in., 40-watt lamps, made by the *Benjamin Electric Mfg. Co.*, Des Plaines, Ill., conforms to similar specifications. As the light output of the two fluorescent lamps approximates that of an ordinary 200-watt incandescent lamp, comparable levels of illumination are available, but because the light is less concentrated, it may be mounted nearer the floor. Spacing this unit on 10 x 10 ft. centers, 10 ft. from the floor, for example, will produce a uniform illumination of 20 ft.-candles over the floor area. In the Benjamin units, Tulamp type ballast units are used, which incorporate a capacitor in one lamp circuit to bring power factor to unity. They also operate the two lamps far enough out of phase to reduce inherent flicker to a non-objectionable point.

High Illumination Fixtures

FOR local light applications of high intensity, *Benjamin Electric Mfg. Co.* is offering another twin fluorescent fixture for 48-in., 40-watt lamp, but in these units the reflectors are individual units electrolytically polished by the Alzak process, instead of being enameled. This so-called Flur-O-Liter, when located from 3 to 4 ft. above the machine or work



By **FRANK J. OLIVER**

Associate Editor, The Iron Age

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bench will give a lighting level of 100 to 150 ft.-candles. The highly polished, semi-concentrating aluminum reflectors produce a distribution of light which is also advantageous in many high mounting applications. Accessory equipment is identical with that supplied on the Stream-Liter units mentioned above. Housing is steel, with modernistic cast end caps. Suspension is either by chandelier chain or rigid conduit.

ANOTHER fixture intended for the same purpose and using Alzak reflectors is the utility Flu-O-Flector manufactured by the *Edwin F. Guth Co.*, 2615 Washington Avenue, St. Louis. The unit is available in two sizes, for two or four 48-in. lamps, the larger size producing in excess of 110 ft.-candles of light 4 ft. away from the unit. Standard auxiliary equipment is included.

Open End Construction

IVANHOE Super-Lite is the name given a fluorescent fixture employing two 40-watt fluorescent Mazda lamps and introduced by the *Miller Co. of Meriden, Conn.* Like the preceding fixtures, this one includes the new Tulamp reactor, removable starting switch and starting compensator.

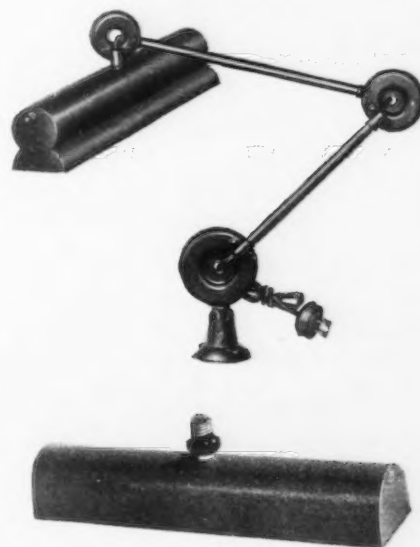


The overall power factor is said to be above 95 per cent and there is a minimum of stroboscopic effect. Chief difference is in the reflector constructor. It is made of steel porcelain enameled inside and out, but the ends are left open and the inner reflector forms a V through the center, provid-

ing a channel which houses the operating equipment and separates the two lamps. This fixture is intended for general illumination of industrial areas, where the units can be mounted 9 to 12 ft. above floor level.

15-Watt Bench Type

A SMALL size fluorescent unit for individual use is being made in several models by *Van Dyke Industries*, 2900 S. Halsted Street, Chicago. The one illustrated is a completely adjustable factory type using an 18-in., 15-watt lamp. A complete line of fittings are supplied whereby the same



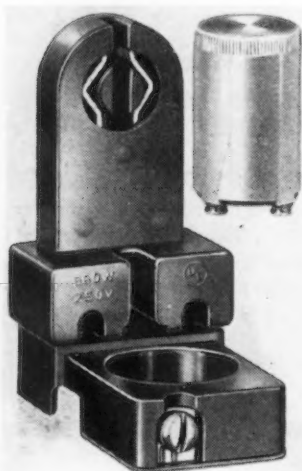
arm and hood can be applied for mounting on benches, ceiling, side wall, drafting board and to pipes. These units give about as much light as an ordinary 100-watt incandescent lamp. Fluorescent lamps for either a.c. or d.c. are optional. Lamps for d.c. come equipped with resistor cord. Standard a.c. current is 100 volts, 60 cycle.

Another type of *Van Dyke* industrial fixture is mounted on an arm adjustable in height and supplied in two lengths of extension. The shade makes one complete revolution in a horizontal plane. This style is made for either 15 or 20-watt lamps. For

inspection lines and for general illumination, the company is offering a self-contained lamp and shade, with screw plug in the center for connection to an ordinary incandescent light socket or drop cord connection. It burns the 15-watt tube.

Fluorescent Lamp Starter

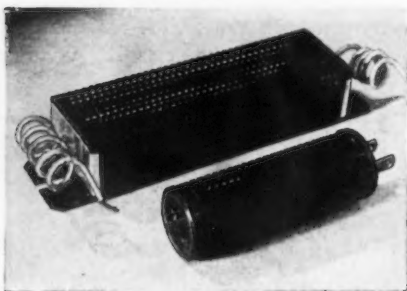
TO simplify the wiring and mounting of fluorescent lamps, a replaceable switch and condenser unit, known as the G-E fluorescent lamp starter, has been introduced by the



appliance and merchandise department of the *General Electric Co.*, Bridgeport, Conn. A new lampholder has been designed for use with the starter. The switch and condenser are inclosed in a small aluminum cylinder fitted with contacts. When mounted in the lampholder, the starter projects through the reflector surface immediately below the lamp. In addition to making the wiring and mounting job easier, the new device simplifies the problem of replacing starting switches and condensers.

D.C. Conversion Resistors

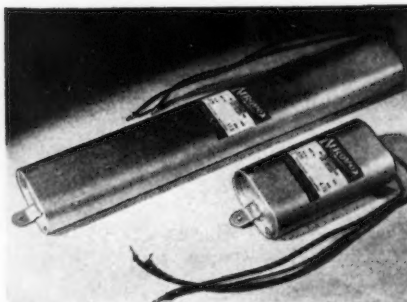
SERIES resistors for inclusion in the power circuit of fluorescent lamps operated on d.c., are announced



by *Clarostat Mfg. Co., Inc.*, 285-7 North Sixth Street, Brooklyn, either as an accessory or as built-in initial equipment. These resistors are intended for use with the G.E. type d.c. reactors or their equivalents. Series FT or accessory type measures $3\frac{5}{8}$ in. long by $1\frac{1}{2}$ in. diameter. It is available for 15- and 20-watt fluorescent lamps. The built-in or initial equipment Series GT unit is oblong-shaped, quite flat. It contains a wire-wound cement-coated power resistor. Unit measures $7 \times 1\frac{13}{16} \times 1\frac{1}{4}$ in., and is made in five types to take care of 15 and 20-watt lamps on 120 volts and 30 and 40-watt lamps on 240 volts.

Power Factor Correctors

POWER-FACTOR correction is essential to the economical operation of fluorescent lamps on a.c., and most of the types described have provision for this in the operating apparatus. *Aerovox Corp.*, New Bedford, Mass., is offering three types of capacitors designed specifically for this purpose.



They are of the oil-filled paper type and may be included in the fixtures as original equipment or may be added later. The three types take care of the requirements of the 12 standard types of fluorescent lamps in general use.

Heavy Duty Incandescent Lamp Fixtures

A HEAVY duty, extremely rugged lighting unit for use in steel mills, forge shops and foundries has been designed by the *Benjamin Electric Mfg. Co.*, Des Plaines, Ill. Called the Steelite, it has a reflector housing drawn from heavy gage metal and finished with a coat of porcelain enamel over which an acid resisting synthetic enamel is baked. The Herculite glass cover is unaffected by extreme temperature changes and is impact resistant to a remarkable de-

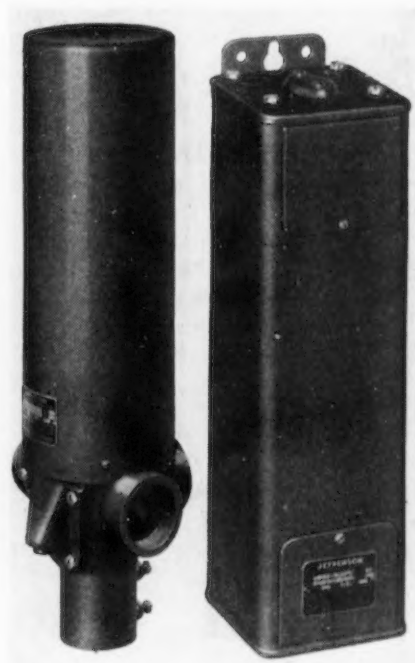
gree. Glass and gasket are secured in a cast aluminum hinged frame which is locked to the housing by six thumb compression latches. Two types of Alzak aluminum reflectors are avail-



able, one a highly polished specular type for high mounting installations, the other having an etched surface for spreading the light at medium mounting heights. These units take lamps from 750 to 1500 watts.

Mercury Lamp Transformers

TO their line of transformers for use with mercury lamps, the *Jefferson Electric Co.*, Bellwood, Ill., has added two types, each designed to operate two 400-watt mercury lamps. The indoor type, right, is rectangular in shape for wall or post mounting with brackets for easy installation,



and with terminals made accessible by means of small doors top and bottom. The weatherproof pole mounting transformer, left, has terminals accessible at the bottom and three threaded hubs so that up to three fixture mounting supports may be used.

High Intensity Diffuser

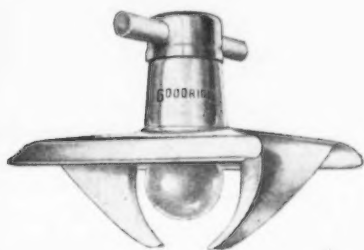
THE Goodrich Electric Co. of Chicago has developed a Protecto diffuser for illuminating areas where precision operations require continuous good vision. This product differs



from other combination reflector and globe fixtures on the market in that it uses an unusually deep-skirted reflector while the glass globe is much smaller in size and is concealed high above the bottom of the reflector skirt. This results in high intensity illumination without the glare caused ordinarily by protruding globes. Goodrich claims that shadows are thereby softened and minute details are clearly revealed. General illumination is also improved as a portion of the light is directed to the ceiling through apertures, in the top of the reflector.

Light for Stock Bins

THE odd shaped fixture illustrated is intended to direct light into stock bins so that proper illumination is obtained from top to bottom shelf and into bin interior. The curved V-shape prevents aisle glare. Properly



spaced, the fixtures provide uniform illumination throughout the section. Compared with an earlier design, the reflecting surfaces are larger, and the fixture is now finished in white porcelain enamel inside and out. This so-called Stocklite is available with pendant, right angle, feed through or outlet box mounting, from the Goodrich Electric Co., 2900 N. Oakley Avenue, Chicago.

Goodrich's Separable reflector is now furnished with a hood of rolled steel construction which combines lightness with greater strength. The thinner wall provides additional wiring space, while deep threads form a better ground connection. It merely takes a quarter turn to release or attach the reflector. The fixture is fitted with a spring mounted resilient socket which is also removable. The improved reflector is finished in porcelain enamel.

Under-Crane Light

UNDER-CRANE lights are subjected to a great deal of vibration and therefore the Holophane Co., 342 Madison Avenue, New York, has brought out a Canelite designed espe-



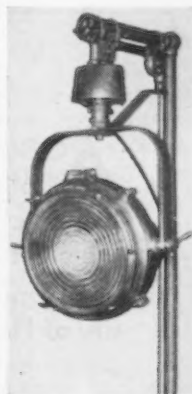
cially for this service. The unit is installed under the catwalk by a 10 in. diameter steel plate and the weight of the unit is suspended from this plate by three compound double acting springs that absorb shock both up and down and in a lateral direction. Recommended practice is to space units on 20 ft. centers, and when using 1000-watt lamps, with crane bottom 40 ft. from floor, the illumination will be 20 ft.-candles on the floor.

A similar type of tripod support is used to hold the reflector in position in the Holophane Lobay reflector No. 645 for use with high intensity 400-watt mercury vapor lamps. A pris-

matic glass reflecting surface is employed with deep reflector construction and a 30-deg. shielding angle. Reflector is open at the top, giving ventilation to the socket.

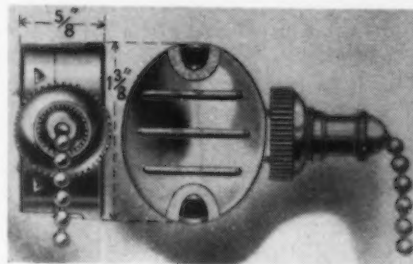
Lamp Lowering Hanger

BECAUSE installation is simple, and safe servicing is permitted, Pyle-National Co., Chicago, has made its cast aluminum floodlight projectors available for use with Thompson lamp lowering hangers. Forged steel trunnions are completely adjustable and provided with locking device and register for returning to original position after servicing. A radial adjustment adapter makes possible both vertical and radial-angle adjustments at ground level. Installation with the lamp lowering hanger is easily adapted to any requirements of yard, platform, driveway and similar outdoor lighting. The 14-in. projector is shown.



Thin Switch Box

THE thin model Levolver switch No. 41, made by the McGill Mfg. Co., Valparaiso, Ind., has been improved and is now given a T rating (6 amp., 125 volts, or 3 amp., 250 volts) by the Underwriters Laboratories. This little switch, only 5/8 in. thick, will take the initial surge of 48 amp. from a cold type C lamp. The maker recommends the switch for use on small power apparatus and for individual control of lighting fixtures in industrial plants. Switches Nos. 42 and 43, of longer stem length, are also



listed under the T rating, as is switch No. 39, equipped with link for use with chain fixtures.

(CONTINUED ON PAGE 98)

MACHINERY MADE

Read This and Weep

ACCOMPANYING are extracts from the recent speech of a college president who does not like the machine. He indicts it for causing unemployment, and declares it is the chief cause of man's woes.

The machine, according to the president of the University of Florida, incites to crime, robbery and murder, eradicates personality and talent, causes girls to go wrong, creates depressions, promotes war and breaks violins.

We are publishing these extracts not because of their intrinsic value but so you inventors, improvers and machinery makers can see how culpable you have been during all of these years. Also so that you can see the type of fool fodder being fed by some educators to the youth of this country. (*Editor.*)

WHEN I was a young man, I heard a college professor lecture on the subject "The Machine Made Millennium." The thesis was that the use of machinery would lift a great burden from the back of mankind, save much wasted time, and ultimately usher in a period of universal satisfaction and happiness. Today, I am taking a subject as alliterative as that address, but with opposing implications. My thesis is to the effect that the machine has brought into human relationships much of an injurious nature. In the early stages of inventions, mankind walked in a fool's paradise. I hold that the machine has done more to complicate the economic, social, and moral relations than any other one factor.

First, let me say there is no question that machinery has increased relatively the amount of unemployment. We know that there are a good many more automobile mechanics than there were

Extracts from an address at Palm Beach, Fla., April 8, before joint convention of Southern Hardware Jobbers' Association, American Southern Hardware Jobbers' Association and American Hardware Manufacturers' Association.

makers of buggy whips; we are familiar with that argument; but one or two illustrations will prove the fact of displacement of labor by the introduction of machinery.

In the period immediately following the Revolutionary War, cotton became king in the South, even though in 1793 the South exported annually only 10,000 bales of cotton.

In recent times before our former markets disappeared, we exported as high as ten million bales of cotton in a single year. It is significant to note, however, that in its earliest form the cotton gin supplanted three hundred workers with one, although, of course, employment was created for those who were to manufacture the machines.

About 2000 B.C. in Egypt, the great pyramid of Gizeh was constructed. It took one hundred thousand men thirty years to place about six million stones that constitute this monument. Modern engineers estimate that this pyramid could be built with a few steam derricks by one hundred men in a year's time. It would seem that there is conclusive evidence that the whole-

sale introduction of machinery has dislocated and relatively reduced employment.

It is the sinister impact of the machine upon society to which I would call your attention. I indict the machine as the principal cause of man's woes, whether at home or abroad.

First, the machine has brought about great social changes. Many bemoan the passing of the old American home. Machinery had more to do with this than anything else. The factory system, the automobile, the lure of the white way with its picture houses attended weekly by eighty million of people, are among the chief conspirators in the destruction of the old-fashioned American home.

The motion picture machine or modern mechanized theatre, has affected the social life of the American people more than any other one thing. There is no doubt that it has profoundly affected morals and customs; it has had an important effect upon criminology. I recall that in the early stages of the motion picture, murders, violent deaths, and similar incidents were never displayed. These were left to the imagination of the audience. Now, as everybody knows, they constitute a large part of the pictures that are produced for the edification of the American public. And let me say with shame, that there is practically no community in the United States where you can not now go and actually hear applause when someone is shot down in cold blood in a picture. The childhood of America is being riven and scarred by exposures which are ineradicable.

Again, the machine has destroyed personality and has made it difficult sometimes for people who are intelligent to do their work. It is a well-known fact that unintelligent people without ambition can stoically perform the simple operations of machinery more efficiently than persons of more mentality. Henry Ford, the master machine-builder of our age, boasts that a good machine can be run by a gorilla. It is certainly true that those human beings who stand along the as-

MISERY



sembling platform in Mr. Ford's plant, each of whom has one specific task to perform day after day, such as inserting a bolt, are more likely to be satisfied and render long service if they do not possess much reason or ambition. Some wag has said that machinery has made it possible for morons to live like gentlemen.

I can remember when most of the daughters in American homes of moderate means were given the opportunity to cultivate artistic accomplishments even though in an amateurish way. Practically every home had its piano, and every daughter was given instruction in music. Mechanical pianos, radios, and other canned music have sent these daughters to the limbo of things forgotten.

Our ancestors took their pens in hand and wrote letters that were admired as artistic achievements. The typewriter has consigned the art of letter writing to oblivion.

Machines Have Bred Immorality

Next to the motion picture, more than anything else, the automobile has profoundly affected American morals and life. I have witnessed and participated in numerous crusades against the saloon and its iniquities. I contend that the old fashioned saloon and the modern bar have not played a more important role in bringing us the moral depression in which we find ourselves than the automobile. The moral depression which we are going through is even greater than the economic depression. More than this, the automobile has probably been the most prolific breeder of crime which has so greatly increased in recent years. Robberies, murders, and other shocking forms of crime have been multiplied by automobiles.

Our trouble is that we have been so completely occupied in the fascinating game of inventing, organizing industries, selling stocks, cutting coupons, and making money, that we have lost sight of, or have become indifferent to the social havoc that we have been creating. Today some persons who are versed in social science advo-

JOHN J. TIGERT
President, University of Florida

• • •

cate a holiday on invention and machines as the only way out.

Machines Cause Depressions

The introduction of machinery and mass methods of production have procreated the periods of economic depression and attendant unemployment in cycles of increasing severity. The one that we are now in, in my judgment, is the worst that we have experienced, though I am aware that some soothsayers tell us that it is no worse than its predecessors.

The nations of Europe today are carrying armaments far heavier than those in 1914, and are engaged in another war that bids fair to eclipse the last one in its destruction, devastation, and misery. It is customarily believed that conceptions of government form the crux of this war. In my judgment, the machine is at the core of the ugly situation in which Europe finds itself.

Machines are the Cause of War

Machinery is not only largely responsible for the conditions which engendered the war fever in Europe, but it is clear that it did much to precipitate the war, and more than anything else, has made modern warfare terrible and miserable for soldiers. In order to avoid unemployment and vast programs of relief such as we have in the United States, European dictators put their unemployed into the armies instead of into the W.P.A. Thus those nations brought a greater proportion of their population under arms than any time in the past, and created personal vested interests in war. It would be over-simplification to expatiate on the destruction that is wrought by modern war machines in comparison to the spears, bows, arrows and other playful weapons that were employed to make war before the introduction of modern artillery, airplanes, and submarines.

The sinister impact of machinery upon art, life, and human happiness is epitomized in an episode that I recall as a major tragedy, though only one poor boy was involved.

The Sad Case of Harry Braun

Harry Braun, a lad of twenty-two, was standing on a street corner in the city of New York with a violin case under his arm. It was one of the priceless instruments made by Guarnerius in the 17th century. Braun came to this country in poverty from Russia. The boy's father had dreamed of being a great opera singer, but his life was consumed in selling clothes. The boy had a violin when he was eleven years old; it was given to him by his mother and cost \$10. This one had been given him by August Heckscher; it cost \$25,000. After a protracted struggle with poverty, young Braun had acquired a wealthy patron. On this evening he was to make his appearance at Carnegie Hall. He had practised eight or ten hours daily for eight months in preparation for this hour. As he stood at the curb in a state of emotion, for a moment his mind wandered and the case slipped from under his arm and dropped into the street. The ponderous wheels of a massive truck moved over it and splintered the ancient violin. Sobbing, the boy gathered up the fragments and hastened to the police station. Nothing could be done; not even a modern Guarnerius could repair it. Is not this the stuff of real tragedy? To the boy the loss was inscrutably cruel, and the world suffered an unusual loss. This instrument had perpetuated for nearly two centuries and one half, the superb craftsmanship of its maker. Its voice, mellowed through the years, is silenced forever, and the prospect of an artist has been blighted. Is not this episode symbolic of our times when great machines, blundering on their courses, are shattering the fine inheritance of the past ages? (Couldn't he have fallen downstairs and broken it?—Ed.)

THIS WEEK

ON THE

By W. F. SHERMAN
Detroit Editor

ASSEMBLY LINE

... CIO sweeps AFL out of picture as auto industrial union by 3-to-1 victory in NLRB poll in GM plants ... Union presses for contract negotiations with motor corporation ... Production gain to 103,725 vehicles for week accompanies sales gains.

DETROIT—The sweeping victory of the UAW-CIO over AFL unions in the NLRB-sponsored elections held in General Motors plants all over the country last week promises to plunge the auto industry into another series of contract negotiations. Hailing success won at the labor polls, Walter P. Reuther, director of the CIO's department for General Motors activity, construed the outcome of the election as "a mandate to win an improved agreement" with the corporation and indicated that immediate contract negotiations would be launched.

The balloting to determine bargaining rights had its origin in the split between Homer Martin, erstwhile president of the United Auto Workers, and John L. Lewis, CIO chieftain. With the division arising between the officials, there arose similar divisions in local unions, with resulting dual representations and dual claimants to the contract which then existed between the UAW and General Motors. In the interim, the contract has had its life extended by General Motors, which at the same time has refused to recognize either faction as more important than the other. In eight

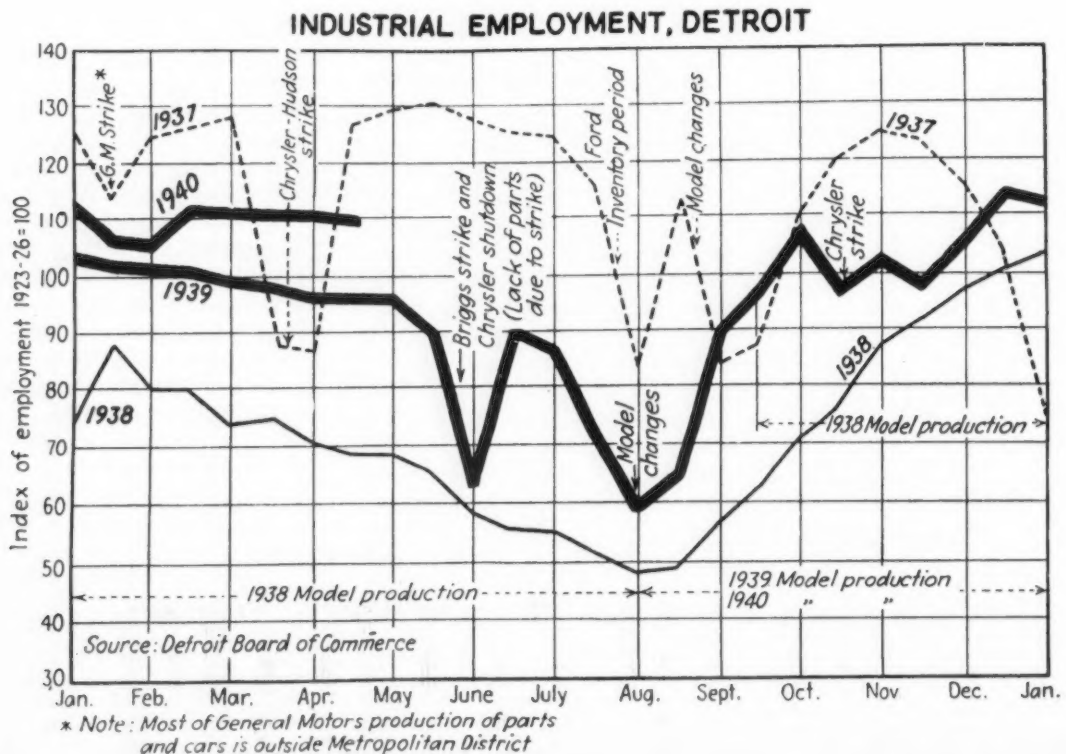
plants dual bargaining systems were in effect.

Competing on an industrial union basis in 58 plants, the CIO defeated the AFL by a 3-to-1 majority, and won the vote in 48 plants outright. Five plants went to the AFL, three by results so close that runoff elections will be required. Workers in one plant (Harrison Radiator at Buffalo) rejected both unions, and tabulations in one other plant left the outcome in doubt. The fifty-ninth GM plant voted for the Mechanics Educational Society of America, an independent union.

AFL craft unions, on the ballots for specific departments in 11 plants, apparently won in seven of the plants, although a runoff vote will be held in one case because of challenged votes.

Voting Was Heavy

Voting was heavy in this election—the largest ever conducted by NLRB—and 94 per cent of the 137,451 eligible employees voted. Sixty-eight per



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• The other half of the answer is in the special angle of the gun tap point and the proper cutting oil, resulting from a G. T. D. Greenfield Engineer's study of the job—on the job.

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cent voted for the CIO; 21 per cent for the AFL, and 11 per cent for neither union.

Three months ago the CIO outlined its program of demands to be made after the elections. Immediate goal is a contract that will recognize the Lewis subalterns and try to efface from memory the name of Homer Martin. Then will come new demands for a general wage increase, for a shop steward system (not yet an entity, although stewards do represent the union in its internal affairs), for changes in the seniority system, for vacations with pay and for union representation in adjusting disputed production standards.

Although the union featured more stringent demands in its election campaigning, these are slated as part of a long-range program and are not expected to be considered seriously in the negotiations which the union hopes now to start. These demands include a 30-hr. week with 40-hr. pay, with guaranteed annual wage. However, if past tactics are any indication, it is to be expected that these issues will be thrown into the discussions and—again, if past experiences are an indi-

cation—they will prolong negotiations and cause some flurries of excitement before they are thrown out again.

Such bargaining tactics appear to be "part of the game" or are used to impress part of the union membership. This sore spot in union technic was denounced recently by General Motors' president, William S. Knudsen, speaking of strikes in the past in the industry. "Lengthy and impassioned negotiations were indulged in on demands which were perfectly silly to begin with, and which had to be patiently dealt with," he said. It remains to be seen whether peace will continue in the industry now that the CIO has virtually spelled the end of the Martin-AFL group.

Output Gaining Moderately

The steady pace of the industry so far this year was continued last week, with output of passenger cars and trucks still above the 100,000 level and showing moderate gains. Retail deliveries running ahead of seasonal expectations were credited with boosting production to 103,725 units, compared with 101,940 (revised) in the previous week and 90,280 in the cor-

responding week of last year, according to Ward's Automotive Reports. This period last spring was the peak of the season's production and marked the beginning of a decline in output totals. Indications of sustained production on 1940 models exist today, however, and even slight increases are possible.

Retail sales of new passenger cars and trucks in the United States totaled 398,013 units during March, an increase of 20 per cent over the same month in 1939, according to the Automobile Manufacturers Association. Passenger cars gained 22 per cent and trucks 11 per cent over the previous year, bringing the first quarter's sales to 967,816 units, an increase of 29 per cent over the first quarter of 1939.

With the peak of the spring sales period to be reached this month or early in May, there is some probability that record heights in sales will be reached by the industry. So far, marks have only approached the 1937 and 1929 peaks, but the trend appears strong enough to exceed the marks set in those years.

Industry Meets with Educators

Industry's stake in education—particularly vocational education—has been stressed twice in recent days by the participation of large numbers of industrial representatives in conferences with educators. The first occasion was the annual Michigan-Ohio Foremen's Conference at the University of Michigan. Staged only once before, in 1939, by the Extension Division of the Ann Arbor school, the conference attracted more than 1800 men for a day of round table discussions in small groups. The attendance more than doubled the 1939 figures. In a keynote address, Captain A. A. Nicholson, personnel manager of the Texas Co., declared that industrial accord could be attained only when three common misunderstandings were eradicated from employees' minds. He declared these to be: "The notion that wealth in America has been amassed in any other way than by the production of more goods; the idea that the increasing use of machines necessarily increases unemployment, and, because business and industry have been instrumental in giving 7 per cent of the world's population more than 50 per cent of the world's wealth, that this nation is therefore rich enough to allow its people to loaf on the street corners of the industrial empire." Another group of 1300 educators and men from industry gathered in Detroit during the

(CONCLUDED ON PAGE 107)

THE BULL OF THE WOODS

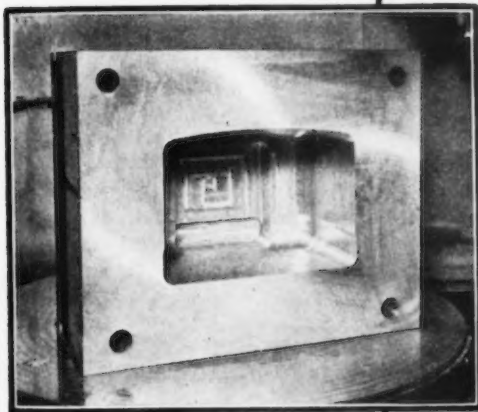
BY J. R. WILLIAMS



"We used to shape our plate stock at a cost of 4¢ to 5¢ per square inch—now we grind it on a Blanchard No. 18 at a cost of less than 2¢ per square inch."

THAT is what one leading die manufacturer said about his costs—and what scores of others are saying about Blanchard Grinding. They use their Blanchards for machining flat surfaces on die bases, punch holders, stripper plates, sectional die parts, drawing dies and hold downs, blanking dies; also on die blocks for forging, die casting and plastic molding.

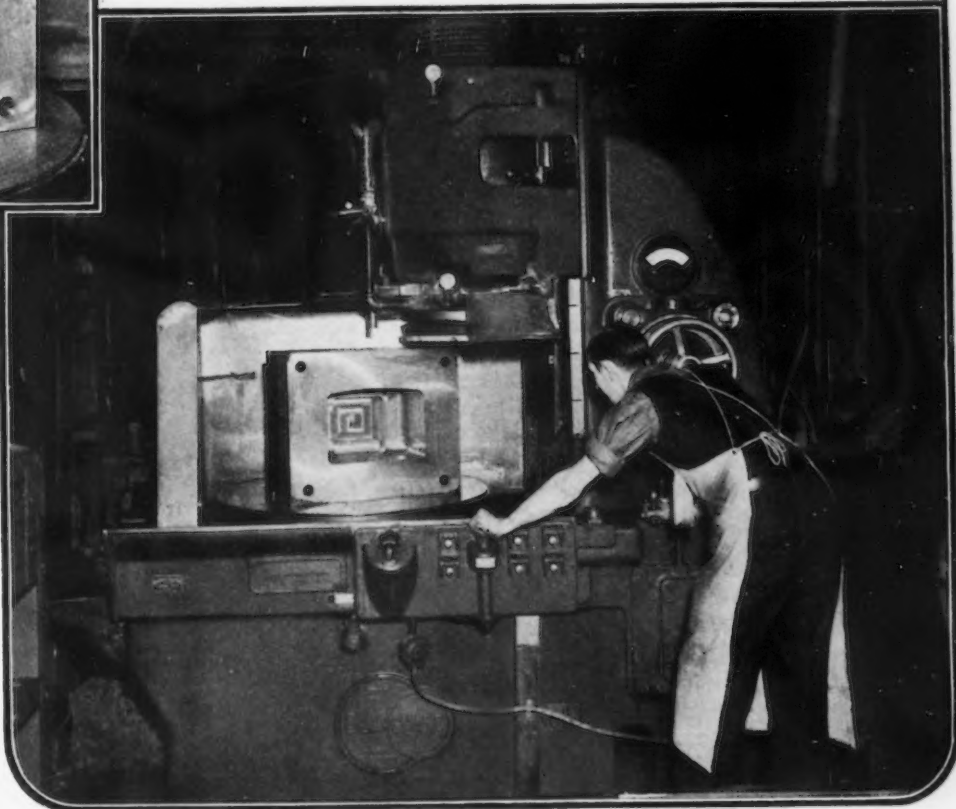
The cost of finishing the outer surfaces of this radio cabinet die, 18" x 22" x 11", $\frac{1}{16}$ " stock per side, was cut in half when ground on the Blanchard No. 18, using Blanchard Sected Wheel.



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THIS WEEK IN WASHINGTON

*... House receives two sets of Wagner Act amendments ...
Smashing House vote for Logan-Walter bill may help bill in
Senate ... Jerome Frank denies SEC hampers small business
financing ... NLRB chief economist denies he is Communist.*

By L. W. MOFFETT
The Iron Age

WASHINGTON—A showdown in the House on amendments to the Wagner Act was assured late last week after the House Rules Committee issued a rule sending to the House floor two sets of amendments—those proposed by the Smith Committee investigating the National Labor Relations Board, and those favored by the House Labor Committee. The action, like the House vote for the Logan-Walter administrative bill, came as a hard blow to administration supporters who were anxious to prevent the Smith amendments from reaching the floor.

Chairman Mary T. Norton, of the labor committee, expressed herself as "amazed" and characterized the move as "underhanded."

"The Rules Committee was merely called to consider some resolutions," the Congresswoman from New Jersey said. "Nobody had been notified that the Wagner amendments would come up. Nobody had the least suspicion of the plan to take up these amendments, least of all Chairman Sabath. Such high-handed procedure is no surprise to the chairman of the Labor Committee, considering the record of the Rules Committee in considering previous labor legislation."

Every Loophole Plugged

While Mrs. Norton displayed deep disappointment over the action, Representative Howard W. Smith, whose NLRB investigating activities led to the introduction of 17 amendments incorporated in a bill which bears his name, smiled and expressed the belief that "we have plugged every loophole."

Under the rule reported, the House would resolve itself into committee of the whole to consider the Norton bill, which is identified as a mild form of

revision being pushed to the front by administration supporters in an ostensible effort to head off the Smith amendments. After general debate not exceeding four hours, the measure would be read, and the Smith bill could be inserted as a substitute after reading of the first section.

Representative Smith said that if it is voted down on that basis he may then offer separately each of his 17 proposals as an amendment to the Norton bill. On the other hand if the Smith bill is accepted as a substitute, that measure also would be wide open to amendment. Present outlook is that the amendments will be debated next week.

CIO Against Norton Bill

The amendments favored by a majority of the House Labor Committee are embodied in a bill introduced by Mrs. Norton. Briefly, they would add two members to the three-man Labor Board, permit craft unions to determine their own bargaining units, allow employers to petition for elections when caught between the cross-fire of two rival unions, and insure for one year the operations of collective bargaining contracts. While the Norton amendments have the support of the AFL, they have been bitterly denounced by the CIO. Business groups regard them as merely superficial. Having these three viewpoints in mind, Mrs. Norton had been hoping to be recognized in an effort to obtain suspension of House rules in order to limit consideration of amendments to her bill.

The Smith bill, which has the approval of a majority of the Special House investigating committee, among other things would create a new three-man labor board; separate the board's prosecuting, administrative and judicial functions; restrict the board's

duties to those of a judge; empower a new administrator to handle investigations and prosecutions; take away from the board the power to call collective bargaining elections on its own motion; prevent the use of the board's services in a controversy between unions over the type of bargaining unit; and permit employers to discuss any subject, including labor problems, with their men, provided there was no threat of discrimination, intimidation or coercion.

The vote to send the Wagner Act amendments to the House floor was nine to one, with Chairman Adolph J. Sabath registering opposition. He called it "the most drastic rule ever reported by our committee."

NLRB Economist Denies Communism

WASHINGTON—David J. Saposs, chief economist, National Labor Relations Board, last week wrote a letter to Democratic Representatives Murdock of Utah and Healey of Massachusetts, members of the Special House Committee investigating the board, denying that he is a communist. His communication was inspired by testimony before the committee. Mr. Saposs took particular note of reference made to him by Mr. Murdock and Mr. Healey in their minority report opposing amendments to the Wagner Act proposed by the majority members of the committee, headed by Representative Smith, Democrat of Virginia.

While disagreeing with the majority, Mr. Murdock and Mr. Healey said that:

"If the excerpts from his (Saposs') writings, which were read into the record are a fair sample of his views we disapprove as strongly as our colleagues of a person entertaining such views holding an important position in the Government."

Mr. Saposs said he is not and never has been a communist, is opposed to all forms of dictatorship and totalitarianism, fascist or communist, and that a careful reading of the record, "it seems to me, indicates that the excerpts are not at all representative."

To support his denial, Mr. Saposs recited what he said was his political and economic philosophy, and accom-



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panied his own statement with excerpts from letters and articles by news columnists, students of labor problems and persons active in the administration of labor law, "all of whom are acquainted with my training and experience, my technical competence and my political philosophy."

Mr. Saposs and the board are greatly concerned over the action of the House Appropriations Committee which would lop off his division for which it has made no appropriation.

Sales of U. S. Planes To Canada Increase

WASHINGTON — Figures just released by the State Department show that licenses for export to Canada of \$15,765,195 worth of aircraft were issued during March. This figure accounted for more than half the value of all exports classified by the State Department as arms and implements of war.

The report showed that export licenses issued during March aggregated \$27,016,887 while actual exports

amounted to only \$17,481,990. For the first three months of 1940 export licenses aggregated \$170,125,821 and actual shipments \$61,041,791.

China, according to the figures made public by the State Department, was the second largest purchaser and obtained licenses during March for the shipment of \$3,149,346 worth of arms, mostly combat airplanes.

Railroads Require Further Modernization

WASHINGTON — Technological progress, always an important factor in railroad history from its early expansion up to more recent years when it has been used as an effective weapon against depression, is looked to by the railroads to meet increased competition, according to testimony given the Temporary National Economic Committee last week by J. J. Pelley, president of the Association of American Railroads.

Appearing before the committee as it went into its second week of hearings on the subject of technological

developments, Mr. Pelley testified that the railroads will require new investment for further modernization, replacements and plant improvements and expressed the belief that the funds can be secured if "competitive handicaps" are removed. The railroads, whose average capital expenditures have averaged only \$259,000,000 a year since 1931 as contrasted with \$843,000,000 annually from 1923 to 1930, would be justified in spending half a billion dollars or more annually for new and improved equipment and other capital improvements, Mr. Pelley estimated.

Reminding the committee that technological progress in the railroad field stimulates employment in other industries, the witness criticized Federal subsidies which he said are given other forms of transportation and insisted that to the extent competitive forms of transportation are placed on an equal footing, "railroads will be enabled to meet their present handicaps."

Under those circumstances, he continued, the industry will again be in the market on a large scale for new equipment, new rail and crossties, ballast, fuel and many other items of materials and supplies. Improvement work requires employment of additional labor, both in the railroad industry and the industries from which it buys supplies, he said, adding: "An increase in traffic to more nearly normal levels will also mean additional employment for railroad maintenance and operating forces."

\$132,646,441 of Steel Bought Under Walsh-Healey Act

WASHINGTON — The Labor Department's public contracts division reports that since the Walsh-Healey Act became effective in September, 1936, contracts for iron and steel products have totaled \$132,646,441; for non-ferrous metals and alloys, \$31,383,273; and for machinery, \$115,439,186.

The division, through which all government contracts are routed to be checked for stipulations required by the Walsh-Healey Public Contracts Act, also reports that during the period contracts for all government purchases totaled \$1,620,041,366. Of this amount Navy contracts aggregated \$736,764,145; War Department, \$477,842,901; and Treasury Department Procurement Service, centralized buying agency for several independent agencies of the government, \$222,867,986.



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War Has Greatly Increased Exports Of Tin Plate by U. S.

WASHINGTON—With European producing countries forced to curtail exports because of war conditions, American foreign shipments of tin plate and taggers tin have risen briskly since last October. Of the 305,525 gross tons exported in 1939, more than one-third, or 104,262 tons, was shipped in November and December, while in January and February of the present year shipments rose to 64,301 tons and 60,643 tons, respectively, aggregating only 32,138 tons less than total exports in 1938, amounting to 157,182 tons. Exports last year, however, were 48,814 tons less than 1937 exports, which totaled 354,339 tons.

1939-38 EXPORTS OF TIN PLATE AND TAGGERS TIN BY PRINCIPAL COUNTRIES
(Gross Tons)

	1939	1938
Brazil	39,099	11,714
Netherlands	33,667	12,075
Canada	28,711	13,730
Philippine Islands ..	16,293	8,940
Mexico	16,207	8,645
Sweden	13,062	3,871
Union of South Africa	12,561	4,664
China	12,119	3,277
British Malaya	10,826	3,173
Netherlands India ..	10,498	...
Cuba	10,450	7,997
Argentina	10,284	4,433
Belgium	9,118	1,003
Chile	8,173	2,914
Egypt	8,126	2,430
French Indo-China ..	7,307	1,305
Norway	6,714	2,493
Uruguay	6,610	4,568
Portugal	6,256	854
Colombia	5,544	2,306
Hong Kong	5,403	2,484
Syria	3,724	2,433
Turkey	3,244	6,944
Spain	2,725	7,154
Venezuela	1,713	1,107
British India	1,648	5,371
Switzerland	1,302	3,871
Greece	1,178	1,631
Kwantung	1,143	1,271
Australia	720	184
Finland	589	169
United Kingdom ..	588	128
Ireland	561	...
All other countries..	9,362	24,043
Total	305,525	157,182

Brazil May Become Exporter of Bauxite

WASHINGTON—Analysis of recently-discovered deposits of bauxite ore may show that there is sufficient bauxite in Brazil for the domestic market and for export, according to a Commerce Department report. Although Brazil has been recognized as having extensive bauxite resources, extraction of the ore has been negligible as compared with that of other producing countries, primarily because of inadequate transportation facilities to remote areas. The new bauxite deposits are located near transportation facilities, the report said.



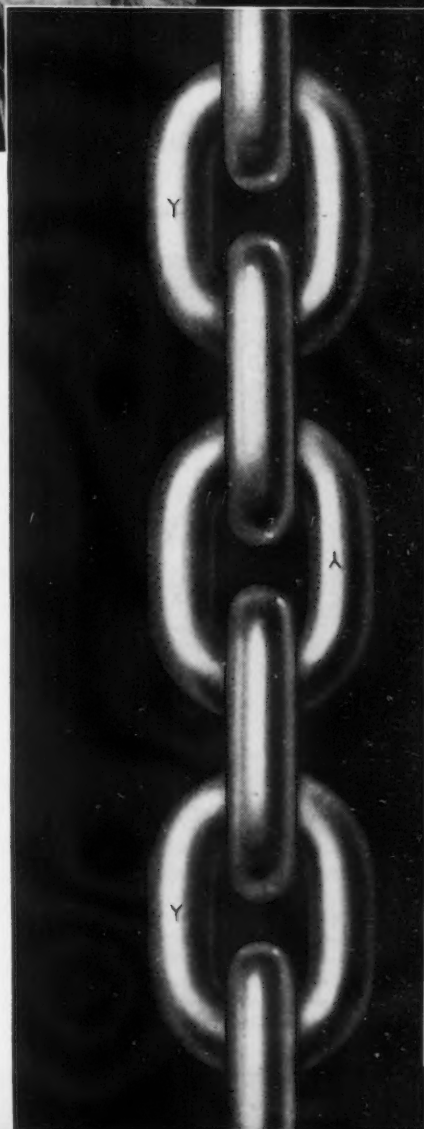
NEW EXCLUSIVE PROCESS INCREASES RUST RESISTANCE—MINIMIZES FRICTIONAL WEAR ON ALL YALE CHAIN

The world's best chain is now better! A new secret plating process developed by Yale makes it so.

Corresponding in a general way to the cadmium plating common to the automobile industry, the secret of this process lies in the final dehydrogenation. Yale has perfected a means of performing this final step in a way which maintains the physical and chemical properties of the steel.

Chain treated with this process—and only such chain—has an impervious finish so satin smooth that frictional wear is reduced to a new minimum. This means less operating effort. As for rust—Yale's new coating makes it practically impossible!

Ask your distributor to show you secret processed Yale Chain. It's the latest hoist advance!



THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION, PHILADELPHIA, PA., U. S. A.
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Makers of Yale Hand Chain Hoists. Electric Hoists, Electrical Industrial Trucks, Hand Lift Trucks and Skid Platforms.

Heavy House Vote May Help Logan-Walter Bill in Senate

WASHINGTON—The Logan-Walter bill to make uniform the rules of administrative procedure for Federal agencies, thereby curbing their functions and providing more adequate court review for aggrieved parties, passed the House last week by a vote of 279 to 97. Vigorously opposed by the New Deal, the measure has been the subject of political log rolling in the House for weeks. Because of the smashing defeat in the House it is now believed that the bill is headed for early enactment into law. The overwhelming House vote has developed this prediction and revises former views that the bill would either be held up in the Senate or killed by it, despite the fact that it passed that branch at the previous session.

It is expected that the bill will get to the Senate floor early next week and be passed by such a sizable majority that the President may not fly in

the face of such strong Congressional sentiment by vetoing the bill. Some quarters think that the Senate vote actually will come near to a two-thirds majority that could override a veto. These sources think the Senate vote will run as high as 60 or perhaps one or two more, or slightly under 64, necessary to a two-thirds of the Senate vote. A more conservative estimate is that there is a 60-40 chance of Senate passage.

King Leads Fight

The fight for the bill in the Senate will be led by Senator King, Democrat of Utah, who succeeded the late Senator Logan, Democrat of Kentucky, as chairman of the judiciary sub-committee, which reported the bill favorably at the previous session when under the skillful direction of Senator Logan it was passed by that branch but was recalled upon objection by Senator Minton, Democrat of Indiana, ultra-

New Dealer, who again is expected to bitterly oppose the bill. Assisting Senator King in his fight for passage of the bill are expected to be such prominent Democratic Senators as Hatch of New Mexico, McCarran of Nevada and Burke of Nevada and Republican Senator Austin of Vermont.

Administration lieutenants on Capitol Hill, who had sent out word earlier in the session that the bill "shall not pass," and who were actively lobbying among House members to cut down the margin in favor of the bill, despite contrary pretensions were startled by the vote.

Aimed at Bureaucracy

The Logan-Walter bill, the result of years of study by the American Bar Association, originally was introduced in the Senate by the late Senator Logan, Democrat of Kentucky, and by Congressman Walter, Democrat of Pennsylvania. The bill was directed primarily towards the administrative activities of quasi-judicial agencies making up a growing bureaucracy. Congress, in providing for these commissions and bureaus, unwittingly did not provide a uniform procedure for hearings, a uniform method of procedure, or a uniform means of limiting judicial review. The result has been unbridled and uncontrolled power vested in an increasing number of Federal agencies.

Out in front on complaints from business groups has been the bitterly criticized procedure followed by the National Labor Relations Board in its handling of labor disputes under the Wagner Act. In some cases the board has gone so far as to say that it could take into consideration rumor and hearsay in adjudicating a case, and this viewpoint has been upheld to a certain extent by the Third Circuit Court of Appeals in the Labor Board cases against the Union Drawn Steel Co. and Republic Steel Corp. decided in January, this year. The court said in effect that while the decisions of the board may not be based entirely upon rumor and hearsay, nevertheless rumor and hearsay might be considered.

Reviews Provided

Administration leaders were particularly anxious to defeat the Logan-Walter bill because it would cramp their style by providing more adequate review before orders become effective. Hearings would be mandatory before rules are promulgated and any decisions could be appealed to the courts, thereby speeding up relief without the necessity of resorting to the more

"All-Purpose" ★ AIR ... ✕ COMPRESSORS

As builders of high grade pneumatic apparatus for 70 years, we offer a line of Air Compressors (and accessories), suitable for varied pneumatic requirements in mill and factory. Superior design, high grade materials, skilled workmanship, combine to produce highly efficient and reliable machines that give enduring service at low operating costs ... There is one to fit your specific needs economically. Let us analyze your conditions and make recommendations. " " " " "

Many Types and Sizes up to 200 cu. ft. ★

Type "Z"

A rugged machine, two-cylinder, single-stage, water-cooled; for continuous duty at 140 lbs. air pressure. Has many distinctive engineering and structural features. Sizes 46 to 157 cu. ft. Complete outfit with motor, either direct or belt drive. Separate compressor unit also available for coupling or belt drive ... Catalogue T-2055.

Type "Z"



Westinghouse " " " AIR BRAKE CO. INDUSTRIAL DIVISION PITTSBURGH, PA.

MCKAY

Bar DRAWBENCHES

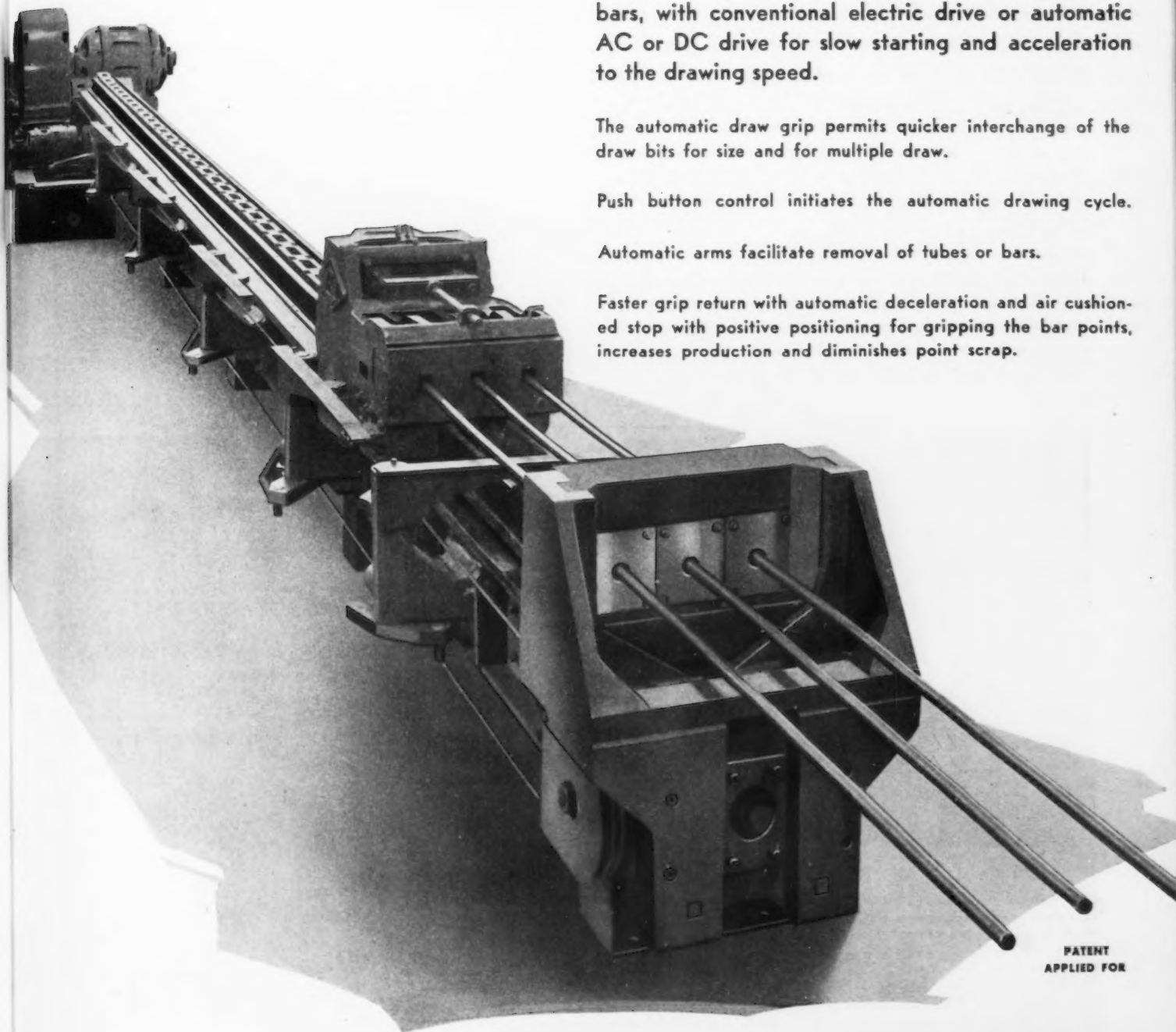
Drawbenches for steel and non-ferrous tubes and bars, with conventional electric drive or automatic AC or DC drive for slow starting and acceleration to the drawing speed.

The automatic draw grip permits quicker interchange of the draw bits for size and for multiple draw.

Push button control initiates the automatic drawing cycle.

Automatic arms facilitate removal of tubes or bars.

Faster grip return with automatic deceleration and air cushioned stop with positive positioning for gripping the bar points, increases production and diminishes point scrap.



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APPLIED FOR

We solicit your inquiries for tube and bar drawbenches.
We also build complete tube forming, sizing, welding
and cut-off equipment.

THE MCKAY MACHINE CO

ENGINEERS AND MANUFACTURERS OF SHEET, TIN AND STRIP MILL EQUIPMENT
YOUNGSTOWN, OHIO

cumbersome remedy of seeking a court injunction.

Specifically exempted from the law, under the original draft of the bill, were the government military and naval establishments, the Federal Reserve Board, the Comptroller of the Currency, the Federal Deposit Insurance Corporation, the Federal Trade Commission, the Interstate Commerce Commission, the Department of State and the Department of Justice. As passed by the House the number of exempted agencies was increased to include the Railroad Retirement Board, the National Mediation Board and the Railroad Adjustment Board.

Throughout the five days of argument in the House, supporters of the administration insisted that the bill would render the agencies ineffective to deal with matters delegated to them by Congress, that their functions would be brought to a standstill. Proponents of the measure emphatically denied that the bill constituted an undesirable curb on administrative activities but only attempted to hamper functions beyond the scope of their delegated authority.

Said Representative Summers, chair-

man of the Judiciary Committee, before the House passed the bill:

"Contrary to all our philosophy of government, we have placed in one appointed personnel all three powers of government. They make the rules; they construe the rules; they enforce the rules. When one of these people goes to an ordinary private citizen he goes to him with all the powers that a king ever had. This man has no power to resist, practically speaking, the mandate of an agent of these bureaus."

Although the White House has until recently been able to keep out of the limelight surrounding the Logan-Walter bill controversy, there have been reports that word was passed along to leaders in both Houses to do their utmost to bottle up the measure. Inserted in the Congressional Record during the course of debate was this statement made by President Roosevelt on March 2, 1930, when he was Governor of New York:

"The doctrine of regulation and legislation by 'master minds,' in whose judgment and will all the people may gladly and quietly acquiesce, has been too glaringly apparent at Washington during these last 10 years. Were it

possible to find 'master minds' so unselfish, so willing to decide unhesitatingly against their own personal interests or private prejudices, men almost Godlike in their ability to hold the scales of justice with an even hand, such a government might be to the interest of the country, but there are none such on our political horizon, and we cannot expect a complete reversal of all the teachings of history."

Only recently the President denounced the general aims of the Logan-Walter bill although he refrained from mentioning it by name but did admit that he had never read the measure. Representative Rayburn, majority leader and acting Speaker of the House, criticized the measure, pointing out that he had been trying "for several days to find out just what it means."

In the words of Representative Elston, Republican of Ohio, the bill was described this way:

"It seeks to more clearly define the rights of the individual in his dealings with the Government. It provides for uniform procedure in Governmental departments, and, if citizens desire it, public hearings may be had before rules and regulations become effective.

"If this bill should pass, citizens may no longer need to fear that they will be prosecuted for rules they never heard of and which they could not find in any publication. While it cannot be expected to correct all of the abuses of power so prevalent under our present departmental system of government, it will go a long way toward protecting personal and property rights.

"Through the creation of bureau upon bureau, Washington has become a wilderness of alphabetical agencies, representing a type of government quite popular in some parts of Europe, but not in keeping with American ideals. The Logan-Walter bill will at least apply American principles to the system."



No guesswork when you buy B-G-R designed-and-produced springs.

B-G-R quality starts with the raw material, laboratory selected to meet your specific needs. And quality is tooled into your spring through every step of completely engineered production.

Two plants—twin-equipped with every modern tool—including electric or gas-fired continuous furnaces, assure fair costs, quicker deliveries, accurate products. Make B-G-R your consulting headquarters for safe, economical spring design.



DETROIT PLANT - 6400 MILLER AVENUE
COOK PLANT - ANN ARBOR - MICHIGAN

Douglas Aircraft Plant Now Employs 16,000

SANTA MONICA, CAL.—The employment in plants of the Douglas Aircraft Co., Inc., has passed 16,000, approximately one-fourth of all employees in the nation's aircraft manufacturing industry now being employed by Douglas. The company's payroll now exceeds \$490,000 a week, an average of more than \$25,600,000 annually, compared with the 1939 payroll of \$10,000,000. The plants are operating on three eight-hour shifts.

"Our Organization Produces Ferro Alloys of Quality"

Ferro Silicon

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*Ohio Ferro-Alloys Corporation
Canton, Ohio*

Summary of reported stocks of iron and steel scrap and pig iron on hand at consumers' and suppliers' plants and in transit, Dec. 31, 1939, in gross tons¹

Item	Consumers' Stocks ²		Suppliers' Stocks ³		Total
	At Plants	In Transit to Plants	At Yards	In Transit to Yards or for Export and at Docks	
Iron and steel scrap:					
Prepared scrap	2,723,210	140,301	1,852,312	110,955	5,504,199
Unprepared or partially prepared scrap .....	.....	.....	677,421		
Total purchased scrap	2,723,210	140,301	2,529,733	110,955	5,504,199
Home scrap	1,733,246	1,321	.....	.....	1,734,567
Total scrap	4,456,456	141,622	2,529,733	110,955	7,238,766
Pig iron	2,755,041	60,859	.....	.....	2,815,900

¹ Subject to revision pending final returns.

² As reported by companies that consumed 93 per cent of total scrap used in 1938.

³ As reported; coverage unknown.

Reported stocks of iron and steel scrap on hand at suppliers' yards and in transit on Dec. 31, 1939, in gross tons

Item	Suppliers' Stocks				Total ¹
	Scrap Iron Dealers	Automobile Wreckers	Railroads	Manufacturers ¹	
Prepared scrap:					
No. 1 heavy melting steel...	432,088	11,136	99,164	9,809	552,197
No. 2 heavy melting steel...	390,577	38,760	5,074	1,200	435,611
Bundles	107,316	684	673	4,322	112,995
Cupola grades	223,742	4,588	28,281	3,056	259,667
All other	303,652	15,731	148,935	23,524	491,842
Total	1,457,375	70,899	282,127	41,911	1,852,312
Unprepared or partially prepared scrap	459,253	106,625	110,587	956	677,421
Scrap in transit to yards or for export and at docks	100,556	1,937	8,462	.....	110,955
Total scrap	2,017,184	179,461	401,176	42,867	2,640,688

¹ Subject to revision pending final returns.

Iron and Steel Scrap Stocks Were Higher at End of 1939

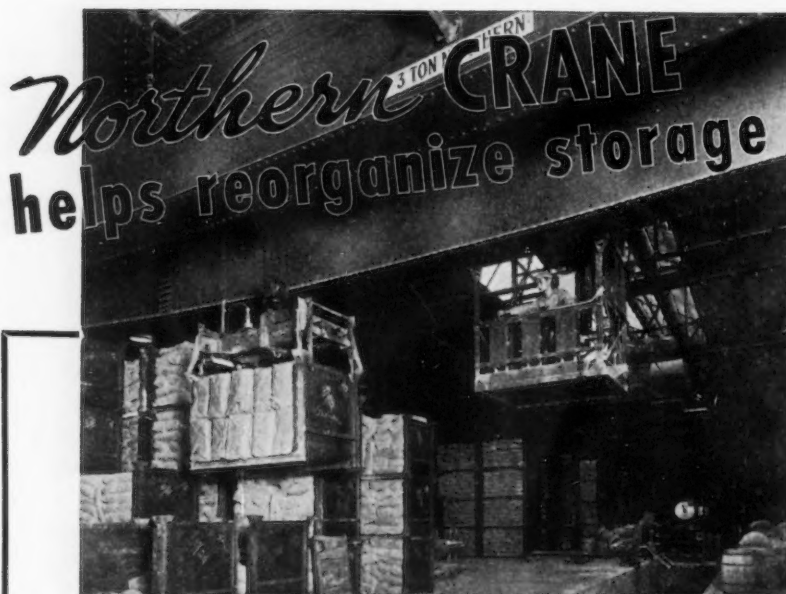
WASHINGTON—The Bureau of Mines' quarterly iron and steel scrap stock report showed last week that iron and steel scrap in the hands of consumers, dealers and in transit at the end of December, 1939, totaled 7,596,000 tons, a 7 per cent increase over the 7,111,700 tons reported as of September 30, 1939. Consumers' stocks at the end of last year were estimated at 4,955,000 tons as contrasted with 4,648,000 tons reported at the end of September. (See THE IRON AGE, Dec. 7, 1939, p. 99).

Stocks in the hands of dealers, railroads, automobile wreckers and others increased from 2,463,701 to 2,640,688 tons, but the report attributed the increase to the larger number of returns received from small dealers in December. As the year ended stocks held by the larger suppliers were reported below the figure at the end of September, with railroad inventories declining 14 per cent for the period.

In the December total were included 5,727,000 tons of purchased or market scrap and 1,869,000 tons of home scrap held at consumers' plants, according to the report. From 719 consumers who accounted for 93 per cent of the total scrap used in 1938, the returns showed stocks of 4,598,000 tons of scrap. From this figure the bureau estimated consumers' stocks at 4,955,000 tons. Scrap consumption in December was reported to be 3,873,000 tons as contrasted with 3,057,000 tons in September. Known stocks held by suppliers and consumers at the end of the year were equivalent to an eight-weeks' supply at the December rate of use.

Scrap On Hand and In Transit

A summary of reported stocks of iron and steel scrap and pig iron on hand at consumers' and suppliers' plants and in transit as of Dec. 31, 1939, is listed below. The figures are based on returns received from 719 consumers representing 93 per cent of the total scrap used in 1938, from 2580 dealers in iron and steel scrap, from 1832 automobile wrecking establishments, from 66 large railroads, and from 202 selected manufacturing plants. Included are some 1500 dealers and automobile wrecking establishments and 202 manufacturing plants not heard from in the September survey.



THE warehouse gang used to handle every sack of frit (raw material for porcelain enamel) by hand, to and from piles 15 feet high. This was the hardest kind of labor and produced clouds of chemical dust which settled all through the plant.

Now a 3-ton Northern Crane handles U-shaped pallets, each carrying two tons of frit as a unit. There is no more heavy lifting, no dust, no more broken sacks at the bottom of the high pile, and movement to and from storage is very much faster.

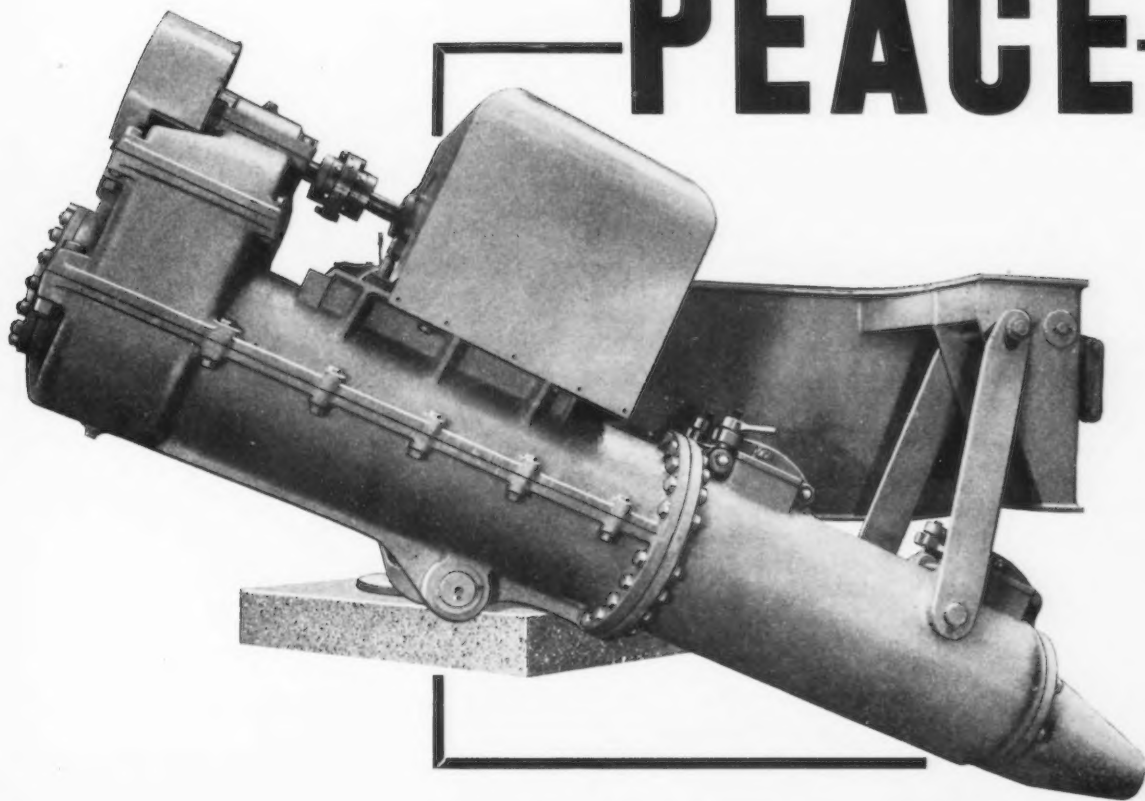
Let Northern engineers study your handling problems.

NORTHERN ENGINEERING WORKS

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CRANES *Northern* HOISTS

A GUN DESIGNED FOR PEACE

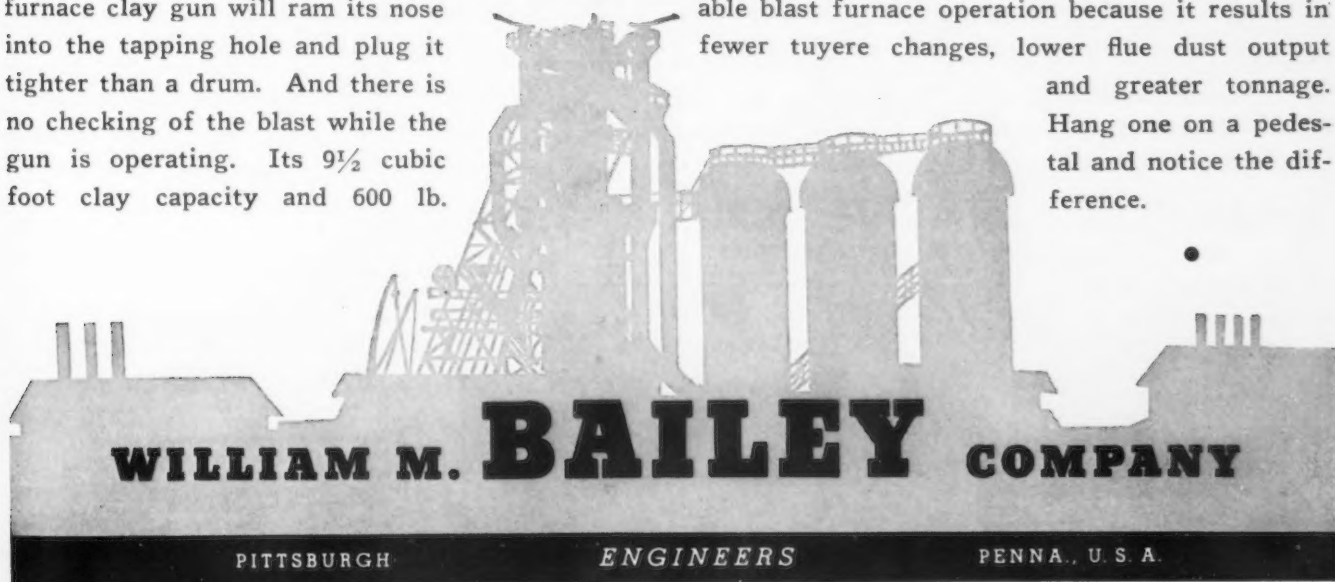


In these currently troubled times, it is refreshing to think of a gun being manufactured for the arts of peace.

THE BAILEY ELECTRIC PLUNGER CLAY GUN

will stop the tapping hole of a blast furnace with full wind on the furnace. In the space of 30 to 45 seconds, this electrically-operated blast furnace clay gun will ram its nose into the tapping hole and plug it tighter than a drum. And there is no checking of the blast while the gun is operating. Its $9\frac{1}{2}$ cubic foot clay capacity and 600 lb.

pressure per square inch makes a long plug of denser clay. Moreover, constant blast pressure assured by this gun is a vital factor in profitable blast furnace operation because it results in fewer tuyere changes, lower flue dust output and greater tonnage. Hang one on a pedestal and notice the difference.



WILLIAM M. BAILEY COMPANY

PITTSBURGH

ENGINEERS

PENNA., U. S. A.

SEC Head Denies Small Business is Hampered

WASHINGTON — Members of Congress who have been shedding tears over the plight of the small businessman and his inability to obtain adequate financing received an emphatic "No" from the Securities and Exchange Commission last week to the query: "Has the SEC been a deterrent to the financing of small business?"

Wrote Representative John W. McCormack, Democrat of Massachusetts, to the SEC:

"There is also a strong feeling existing among businessmen, particularly among that group known as the 'small-businessman,' complying with the regulations and rules, that the expense of such compliance has been a deterrent. I feel that if this situation exists it should be remedied in order that money could be quickly invested in productive enterprise, thereby increasing opportunities for employment."

New Set-up to Meet Needs

SEC Chairman Jerome N. Frank, who has previously gone on record in

favor of some form of regional capital-credit banks for "successful small businesses," replied that "the difficulties of flotation of securities for deserving small business enterprises lie not in burdens imposed by the registration requirements of the Securities Act but almost exclusively in the gaps in our present financial mechanism. Said Mr. Frank:

"If we want to reduce the cost of flotation of small issues significantly and, what may be more important, if we want to create a fairly large and reliable market for such issues, we shall have to construct new machinery expressly designed to meet the needs of small-business enterprises for long-term capital particularly in equity form."

Suggesting that this may be done by private initiative alone, the SEC chairman pointed to measures which he said already have been taken by the agency to reduce the expense and inconvenience to small enterprises in registering new securities. He concluded that only a small part of the total high cost of flotation of small issues can be traced to the registration requirement of the Securities Act.

Large Allied Aircraft Orders Placed in U. S.

WASHINGTON—Initial orders in the allied \$1,000,000,000 plane buying program have been placed according to a statement made on April 18, by Arthur B. Purvis, chief of the Anglo-French Purchasing Mission, in which he indicated that large quantities of the latest type Curtiss pursuit planes and Douglas bombers have been ordered. Although the number of planes was not specified, it is understood that these initial contracts include some 750 Douglas bombers, about 1500 Curtiss pursuit ships and about 750 Martin bombers, totaling about \$250,000,000.

Negotiations for about \$350,000,000 more planes are expected to be concluded within the next two months. Mr. Purvis indicated that contracts would soon be closed with the Lockheed and the Glenn L. Martin Co., both of whose latest models have been released by the War Department to the Allies.

Government Contracts

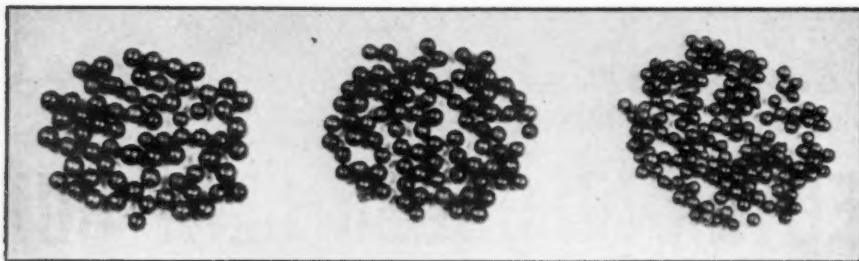
WASHINGTON—Government contracts for iron and steel products, as reported for the week ended, April 13, by the Labor Department's Public Contracts Division, totaled \$978,635. For the same period contracts aggregated \$230,337 for non-ferrous metals and alloys; and \$1,167,116 for machinery. Details follow:

Iron and Steel Products

Albert Pipe Supply Co., Inc., Brooklyn, Panama Canal, steel pipe ..	\$42,274.54
Lansdowne Steel & Iron Co., Morton, Pa., War Ordnance, shell forgings ..	11,000.00
Central Iron & Steel Co., Harrisburg, Pa., Puget Sound Navy Yard, steel plate ..	20,150.99
Atlantic Screw Works, Inc., Hartford, Navy S&A, screws ..	11,917.86
McKay Co., York, Pa., Navy S&A, chains and rings ..	15,036.82
Norris Stamping & Mfg. Co., Los Angeles, Navy S&A, ammunition boxes ..	334,524.96
Carnegie-Illinois Steel Corp., Washington, D. C., Navy S&A, steel plates ..	496,620.28
J. R. Hunt & Co., Baltimore, War QMC, motor maintenance equipment ..	20,944.57
Sheffield Steel Corp., Kansas City, Panama Canal, structural steel ..	15,046.51
Lewis-Shepard Co., Watertown, Mass., Navy S&A, torpedo skids ..	11,118.55

Non-Ferrous Metals and Alloys

The Atwater Mfg. Co., Plantsville, Conn., War Ordnance, fuze adapters ..	\$72,450.00
Eclipse Machine Division, Bendix Aviation Corp., Elmira Heights, N. Y., War Ordnance, adapters ..	23,800.00
Aluminum Co. of America, Washington, Navy S&A, aluminum-alloy ..	34,742.40
Revere Copper and Brass, Inc., Baltimore division, Baltimore, Navy S&A, copper tubing ..	20,944.70
Chase Brass & Copper Co., Inc.,	



IN the period of one year we have built up a very large business with our Heat-Treated Steel Shot and Heat-Treated Steel Grit. This was accomplished on purely a quality product. Our many hundreds of customers, nationally known Concerns, are using our Shot and Grit, and sav-

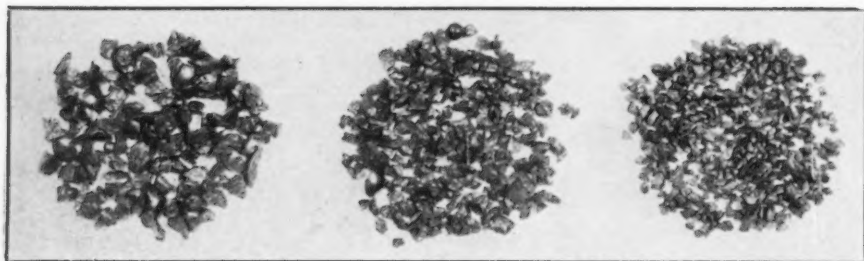
ing money every day, blasting faster with less wear of abrasive. Our heat treating insures toughness and strength, fast blasting and long wearing. Try it in your machine and prove the truthfulness of these statements.

**We never
compromise
with quality**

A ton or a carload.
Will match any size.

HARRISON ABRASIVE CORPORATION

MANCHESTER, NEW HAMPSHIRE



9 PLANTS

Ready to do your manufacturing!

These plants are in constant operation. They are not for sale, but have facilities for additional production.

Should it be advisable to supplement your present facilities or be advantageous to manufacture certain parts at strategic points for more economical distribution, these plants offer one or more of 9 locations.

8 of them span the country from east to west, and one is located in Canada.

The company offering you this service is nationally known, and its equipment includes the following:

Benders
Bulldozers
Forging Hammers
Upset Forging Equipment
Foundries — Heat and Corrosion
Resisting, Grey Iron, Manganese
Steel
Punches & Shears
Welding Apparatus
Riveting Machines
Presses, Hydraulic
Drills — Vertical & Horizontal,
Single and Multiple Spindle

Grinders—Hand, Swing and Surface Type
Lathes—Turning 32 inches diameter, length 12 feet
Planers, Special
Shapers
Milling Machines
Heat Treating Equipment
Saws—Cold Cutting
Cranes & Hoists
Laboratory—Metallurgical Chemical & Physical

ADDITIONAL MACHINES WILL BE PROVIDED IF VOLUME OF WORK JUSTIFIES

Road Construction, Agricultural Equipment, Machinery, Airplane, Household Appliances, or other manufacturers may find these plants advantageously located.

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BOX T-690, CARE THE IRON AGE
239 West 39th Street New York City

Waterbury, Conn., War Ordnance, cartridge brass disks	68,400.00
Bohn Aluminum & Brass Corp., Detroit, War Ordnance, bodies	10,000.00
American-La France-Foamite Corp., Elmira, N. Y., Procurement, fire extinguishers	Indefinite

Machinery

Hardinge Brothers, Inc., Elmira, N. Y., National Advisory Commission for Aeronautics, milling machines	\$11,038.00
Tinius Olsen Testing Machine Co., Philadelphia, National Advisory Commission for Aeronautics, testing machine	11,300.00
Leslie Co., Lyndhurst, N. J., Boston Navy Yard, valves	12,456.38
Atwood & Morrill Co., Salem, Mass., Boston Navy Yard, valves	11,574.62

John E. Shriver, Cincinnati, War Air Corps, brake shoe grinders..	11,616.00
Bodine Corp., Bridgeport, Conn., War Ordnance, drilling machines	27,090.00
Kingsbury Machine Tool Corp., Keene, N. H., War Ordnance, drilling machines	17,132.00
Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, Navy S&A, toolmakers' lathes	13,956.00
Rockford Machine Tool Co., Rockford, Ill., Navy S&A, planer shaper	11,810.00
Smith-Courtney Co., Richmond, Va., Navy S&A, shapers	16,018.10
Lodge & Shipley Machine Tool Co., Cincinnati, Navy S&A, engine lathes	37,922.00
Tidewater Supply Co., Inc., Norfolk, Va., Navy S&A, turret lathe	10,019.56

Bullard Co., Bridgeport, Conn., Navy S&A, turret lathe	13,511.25
Walworth Co., New York, Navy S&A, valves	45,013.64
Seaboard Brass & Copper Co., Baltimore, Navy S&A, valves	19,134.40
The R. K. LeBlond Machine Tool Co., Cincinnati, Navy S&A, lathe	30,041.00
Smith-Courtney Co., Richmond, Va., Navy S&A, grinder	10,209.00
McKiernan-Terry Corp., New York, Navy S&A, winch	57,071.00
Jones & Lamson Machine Co., Springfield, Vt., Navy S&A, thread grinder	11,969.93
Micro-Westco, Inc., Bettendorf, Iowa, Navy S&A, internal grinder	21,150.95
Worthington Pump and Machinery Corp., Washington, Navy S&A, pumps	252,586.00
Buffalo Pumps, Inc., Buffalo, Navy S&A, pumps	229,630.00
Worthington Pump and Machinery Corp., Washington, Navy S&A, air compressor	24,786.00
Northern Pump Co., Minneapolis, Navy S&A, pumps	19,264.00
Worthington Pump & Machinery Corp., Washington, Navy S&A, pumps	35,912.00
American Blower Corp., Washington, Navy S&A, ventilating fans ..	17,553.60
Pioneer Engineering Works, Inc., Minneapolis, Procurement, construction and road building machinery parts	Indefinite
Schramm, Inc., West Chester, Pa., Procurement, construction and road building machinery parts ..	Indefinite
Universal Crusher Co., Cedar Rapids, Iowa, Procurement, construction and road building machinery parts	Indefinite
Gar Wood Industries, Inc., Detroit, Procurement, construction and road building machinery parts ..	Indefinite
Worthington Pump & Machinery Corp., Washington, Procurement, construction and road building machinery parts	Indefinite
Yale & Towne Mfg. Co., Stamford, Conn., War Air Corps, pumps ..	19,100.00
Brown & Sharpe Mfg. Co., Providence, War Air Corps, milling machines	22,712.00
E. A. Kinsey Co., Dayton, Ohio, War Air Corps, milling machines	24,384.50
The American Tool Works Co., Cincinnati, War Ordnance, engine lathes	21,647.00
W. T. Rapp, Philadelphia, War Ordnance, engine lathes	42,246.50
Harris Seybold Potter Co., Cleveland, GPO, printing presses	34,010.00
E. H. Walker Supply Co., Washington, GPO, printing equipment	23,251.13

New! TWO NEW "SHAW-BOX" "Load Lifter Jr" HOISTS



500 POUNDS
AND
1000 POUNDS
LIFTING
CAPACITY

For those "tough" handling jobs where the loads weigh up to 500 or 1000 pounds — two new "Load Lifter Jr." Electric Hoists... On production jobs, on jobs where constant uninterrupted hoisting service is a necessity, these are the hoists that give the performance you seek... Made available in these new sizes because of the demand for the same unexcelled performance that the original "Load Lifter Jr." Hoists of 350 and 700 pounds lifting capacity

are giving, on the "tougher" lifting jobs everywhere.

Some advantages are — low head room, fast speeds, forged steel gearing, anti-friction bearings, and the ability to "stand-up" under the most severe service conditions, and attractive prices.

You will want to know all about these two new small capacity hoists... Send for catalog containing complete information about them. It's free!

Makers of all types and sizes of Electric and Hand Operated Cranes, and Electric Hoists, including the famous Portable Electric "Budgit" Hoists... Send all your inquiries for cranes and hoists to "Shaw-Box"!

SHAW BOX CRANE & HOIST DIVISION

MANNING, MAXWELL & MOORE, INC.

402 BROADWAY

MUSKEGON, MICHIGAN

Construction Contracts Gain Slightly Over 1939

THE dollar total of private construction contracts awarded in the 37 Eastern States during the month of March was 2½ per cent greater than the total for March, 1939, according to F. W. Dodge Corp. This March record, added to previous gains, gave to the first quarter's private construction volume a moderate lead over the first quarter of last year, though the increase was not sufficient to offset the declines that have taken place in public construction contracts. In March, contracts for public building and engineering projects ran 26 per cent behind March of last year; the month's total of all construction contracts aggregated \$272,178,000 last month, compared with \$300,661,000 in March, 1939. Commercial and manufacturing building contracts showed marked gains last month.

Editor Warns Other Nations Plan Post-War Trade Expansion

CHICAGO—An overflow crowd of more than 300 industrial advertising and sales executives last week heard John H. Van Deventer, president and editor of *THE IRON AGE*, discuss the possibility that many foreign markets will be lost to the United States after the war is over as a result of the present volume of exports of production machinery.

Speaking at the Midwest Regional Conference of the National Industrial Advertisers Association, Mr. Van Deventer declared that so many late model American machine tools and other equipment have been shipped abroad in the past five years that the leading overseas nations now have first class manufacturing capacity far beyond their normal peace-time production requirements.

If the war lasts only one or two years, said Mr. Van Deventer, these machines should be in excellent condition, and American manufacturing plants must double the rate at which they have been junking old equipment and replacing it with new if they expect to be able to meet foreign competition when the war is over. This situation, together with low labor rates, is likely to prove a serious threat to American trade in manufactured products in South America and elsewhere.

Furthermore, he pointed out, over the past 10 years American industry has accumulated a deficit in investment in plants and equipment of nearly 36 billion dollars, while at the same time 17 billions in "timid" money and credit has been accumulated. Declaring that this capital investment log jam must be broken before American industry can put itself in a cost position to meet competition from all quarters, Mr. Van Deventer urged the makers and merchandisers of capital equipment to transmit their initiative and enterprise by means of promotion and advertising to American manufacturers so as to convince them of the vital need of mending their cost fences.

A.F.A. Medalists Announced

RECIPIENTS of the 1940 gold medal awards of the American Foundrymen's Association are Nathaniel K. B. Patch, Lumen Bearing Co., Buffalo; Frederick K. Vial, Griffen Wheel Co., Chicago; Frederick A. Melmouth, Detroit Steel Castings Co., Detroit, and Harry W. Dietert, Harry

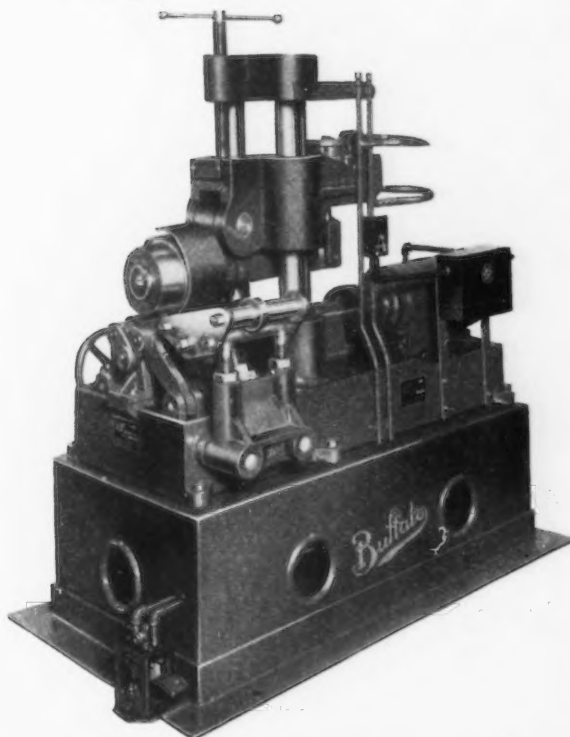
W. Dietert Co., Detroit. Formal presentation of the awards will be made at the association's annual convention in Chicago, May 6 to 10.

George A. T. Long, Pickands Mather & Co., Chicago, is to be awarded an honorary life membership in the association, in recognition of his efforts in

the cupola, pig iron and coke consulting field.

The board of awards of the foundry association cited Mr. Vial for his outstanding contributions to the development of cupola melting and Mr. Patch for his achievements in the foundry industry. Mr. Dietert's selection was based on his consistent and successful efforts to promote foundry sand research and control, while Mr. Melmouth was commended for his contributions to the steel industry.

ROLL YOUR OWN RINGS AND CYLINDERS on a "Buffalo" WRAPPING ROLL



The latest Buffalo Improved designs are producing *better work in less time than ever before*. Your product costs are bound to shrink when you use a "Buffalo."

Metal circles ranging in thickness $1/16"$ to $1\frac{3}{4}"$, diameters $3\frac{1}{2}"$ to 36" are rolled as fast as the material can be handled. There is a size and capacity range to suit every need.

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Management Society Discusses Problems

CLEVELAND—Keeping production costs in line is primarily a function of the production department, said W. C. Wright, manager of supervisory training, Goodyear Tire & Rubber Co., Akron, Ohio, in an address at the spring conference of the Society for the Advancement of Management.

"Your production manager comes

nearer to being the real manager of his department today than anyone else in your organization," said Mr. Wright. "He must be conscious of everything pertaining to cost, welfare and creditable performance. Foremen and supervision today are definitely a part of management."

The future outlook for business contains two enormous questions, asserted Donald B. Gillies, vice-president, Republic Steel Corp., in an address before the same conference.

Regardless of whether the New Deal

is ousted, the national debt, necessity of caring for the unemployed and unemployable and the problem of making present legislation more workable will remain to be solved, he asserted.

Another factor that business will have to reckon with is both the immediate and the long term effects of the present European conflict, continued the speaker.

"We must remember that nations which have been our major foreign customers are today engaged in using up their resources in warfare. They are literally burning up their purchasing power," he said.

Mr. Gillies reminded his audience that the United States represents the largest and richest single market in the entire world, has less regimentation and control of business than any other major country and the people of the United States are educated to demand a constantly higher standard of living.

Praises Wagner Act

The conference heard Stuart Symington, president, Emerson Electric Mfg. Co., St. Louis, assert that, while the Wagner Act has been administered badly, it has brought the average employer closer to his employees.

"A majority of the people run the show in this country," he said. "The constitution states this. The people have taken plenty of power since this country started and they are going to take more power, so why not start educating the masses, and bring the employee into closer sympathy with problems of the management?"

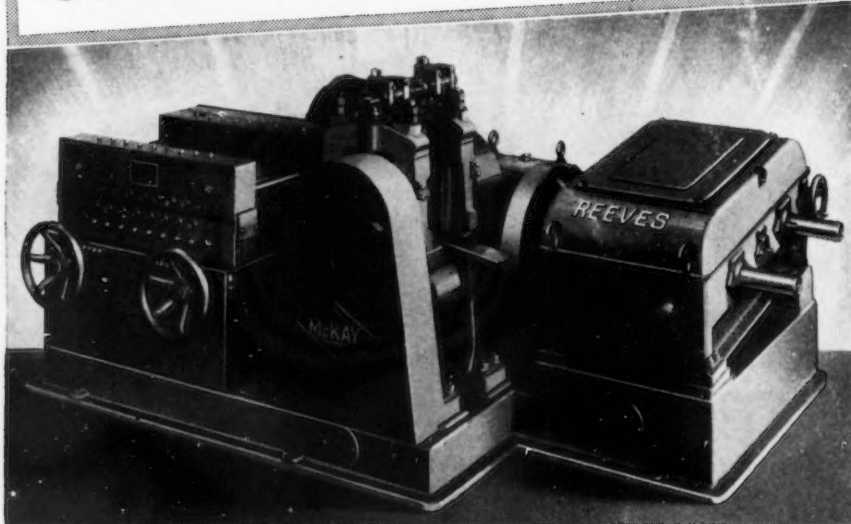
Mr. Symington disagreed with statements in an *IRON AGE* article that employment had been increased in sheet steel production since the introduction of the continuous mills. He asked the question, "What has happened to the foundry business while sheet steel has expanded?"

(Editor's Note:—Testimony bearing out statements previously published in *THE IRON AGE* was given before the Temporary National Economic Committee by Charles R. Hook, president, American Rolling Mill Co., and appears in *THE IRON AGE* of April 18, page 62. Mr. Hook's figures in support of his assertions were taken from U. S. Department of Labor indexes of employment in manufacturing industries.)

Welding Clinic

A WELDING demonstration has been scheduled for welders in the Chicago area on May 16 and 17. Welding engineers of International

REEVES SPEED CONTROL On Continuous Strip Shear



PERMITS HANDLING MANY WIDTHS AND LENGTHS OF METAL STRIPS...

★ Accuracy in cutting strip steel to predetermined lengths was the requirement which led the McKay Machine Company to choose REEVES Variable Speed Control as standard equipment for the machine shown above. Differing widths and gauges of metal strip are cut to any length, from 4' to 20', by using proper knife combinations and adjusting REEVES Transmission. Thousands of REEVES Variable Speed Transmissions, Vari-Speed Motor Pulleys and Vari-Speed Motodrives, are similarly used on a wide range of metal working machines, both as standard equipment, and on machines in service. Catalog G-397 illustrates and describes many of these installations. Write for it.

REEVES PULLEY COMPANY, Dept. 1, COLUMBUS, INDIANA

REEVES SPEED CONTROL

Nickel Co., Aluminum Co. of America, Revere Copper & Brass Co., and Handy & Harmon, Inc., will take part in the actual welding operations at the "clinic." The demonstrations will cover the latest developments in welding technique as applied to nickel and high nickel alloys, brass, copper, aluminum and aluminum alloys.

The clinic will be held at the Chicago warehouse of the Steel Sales Corp., 3348 South Pulaski Road.

Pittsburgh Foundrymen Headed by R. C. Heaslett

PITTSBURGH—At a meeting here last week of the Pittsburgh Foundrymen's Association, R. C. Heaslett, Continental Roll & Steel Foundry Co., was named president, succeeding J. H. Johnston, Westinghouse Electric & Mfg. Co. Leo F. Kelly, Fort Pitt Malleable Iron Co., succeeds Mr. Heaslett as vice-president and C. H. Paul, Mackintosh-Hemphill Co., has been renominated secretary-treasurer. Nominations for the executive committee include H. P. Spilker, Sterrit-Thomas Foundry Co.; T. A. Reynolds, McConway & Torley Corp.; H. M. Wilson, Taylor-Wilson Mfg. Co.; H. B. Reed, Westinghouse Air Brake Co.; and C. I. Niedringhaus, Mesta Machine Co. The new officers will take over after the annual outing in June.

Electric furnace construction, operation, and use was discussed at the meeting. The principal speaker was Frank W. Brooke, Swindell-Dressler Corp., whose subject was "The Electric Furnace as Applied to the Melting of Steel and Iron."

Publishes Sixth Edition Of Arc Welding Handbook

A CONSIDERABLY enlarged edition, the sixth, of its "Procedure Handbook of Arc Welding Design and Practice," has been published by the Lincoln Electric Co., Cleveland. Bound in semi-flexible simulated leather, the new volume contains 1125 pages, 5¾ x 9 in., and a total of 1557 illustrations.

A large amount of new data, made available by arc welding progress since the previous edition, has been included. Type matter and illustrations have been condensed and the book is printed on lighter, finer paper stock, which results in a reduction in bulk, despite the inclusion of some 20 per cent more material.

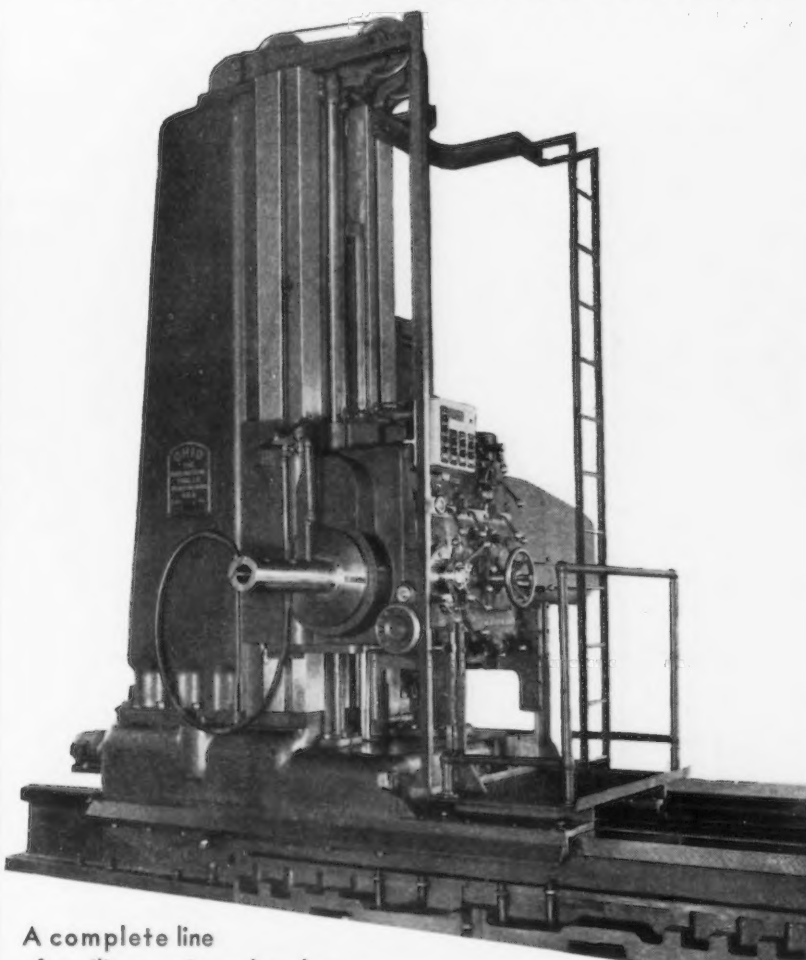
Five of the eight principal sections

cover: Welding methods and equipment; technique of welding; procedures, speeds and costs for welding mild steel; weld metal and methods of testing; and weldability of metals. The last three sections, accounting for 713 pages and 1090 illustrations, are devoted to: Designing for arc welded steel construction of machinery; designing for arc welded structures; and typical applications of arc welding in manufacturing, construction and maintenance. An additional section is devoted to general reference data, such as weights of alloys and metals, conversion tables and the like.

Subjects on which new material has been added include standard nomenclature, welding symbols, stress distribution in welded joints, distortion control, weld inspection, welding electrodes, estimating of welding costs, production costs for various types of joints, weld metal and methods of testing, and many others.

The book, encyclopedic in scope, is designed for use of engineers, architects, designers, production managers, welding supervisors and operators. The price is \$1.50, domestic postage prepaid, and \$2 outside the United States.

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of auxiliary, universal and compound tables, boring bars, suitable bed plates and accessories are available.

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Resistance Welder Group Announces Prize Contest

A PRIZE contest for technical papers on resistance welding has been announced by the Resistance Welder Manufacturers Association. This contest, which terminates at midnight, Aug. 31, is open to anyone in the United States, its possessions and Canada, and to members of the American Welding Society in any grade throughout the world. There are seven

prizes, namely, one of \$300, one of \$200, one of \$100 and four of \$25.

Papers will be judged on the following bases: Educational value, 30 points; fundamental or research value, 30 points; practical application, 25 points; and presentation, 15 points. Minimum length requirement is 2500 words. It is required that papers shall be well presented, with concrete facts where possible together with photographs, tables, and charts, etc. Relative merits of submitted papers will

be determined by three judges appointed by the American Welding Society.

It is stated that papers submitted in the contest may at the discretion of the editors of the *A.W.S. Welding Journal* be published in the *Journal* or in any other technical publication and not necessarily waiting until the expiration date of the contest.

Papers which are to be presented at the annual meeting of the American Welding Society in Cleveland next October may also be entered in the contest, provided a draft or copy of the paper is filed with the American Welding Society not later than Aug. 31.

Further details of the contest rules may be had from the Resistance Welder Manufacturers Association, 505 Arch Street, Philadelphia, or from the American Welding Society, 33 West 39th Street, New York.



An Assist! By **ATLAS**

View at Prominent Iron Foundry

To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket rolls down to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket rolls down to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

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Manufacturers

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Reservations at National Metal Show Set Record

CLEVELAND — Space reservations for the 1940 National Metal Congress and Exposition here Oct. 21 already exceed the entire floor space occupied at the Chicago show last year and are the largest in the history of the Society's twenty-two expositions.

On April 6 requests had been received for over 86,000 sq. ft. of space. In addition to being in excess of the total amount sold at the Chicago show last year, this was a greater amount of space than was provided for in the layout of the Cleveland Auditorium.

It has been impossible for the committee to assign space, as it will be necessary to lay out additional exhibit area in the Auditorium and then permit all previous exhibitors to have an opportunity to make new selections, if they so desire, including the newly laid out space. There will be plenty of show space available in the Public Auditorium, up to 150,000 sq. ft., but the amount of space laid out was in accordance with the size of previous expositions.

Warehouse Association Chapters Elect Officers

CLEVELAND — The following chapters of American Steel Warehouse Association have elected officers as follows for the coming year, W. S. Doxsey, executive secretary, Terminal Tower, Cleveland, announces:

Cincinnati Chapter: president, J. C.

Wagner, Todd-Donigan Iron Co., Louisville, Ky.; vice-president, W. A. Kruse, Jr., Union Iron & Steel Co., Cincinnati; vice-president and treasurer, J. C. Betz, S.A.E. Steels, Cincinnati; secretary, G. E. Mayer, Jones & Laughlin Steel Corp., Cincinnati; national director, J. A. Thiele, Miami-Dickerson Steel Co., Dayton, Ohio.

Connecticut Chapter: president, R. B. Shearer, the C. S. Mersick & Co., New Haven; vice-president, S. H. Hascall, the Blodgett & Clapp Co., Hartford; secretary-treasurer, G. S. Brouso, the C. S. Mersick & Co. Mr. Shearer will also serve as national director.

New England Chapter: president, P. F. Avery, Avery & Saul Co., Boston; vice-presidents, M. C. Harvey, Arthur C. Harvey Co., Boston, and Quincy W. Wales, Brown-Wales Co., Boston; secretary-treasurer, J. B. McIntyre, Scully Steel Products Co., Boston; national director, G. M. Congdon, Congdon & Carpenter Co., Providence, R. I.

Pittsburgh Chapter: president, J. M. Hilbish, Jones & Laughlin Steel Corp., Pittsburgh; vice-president and national director, J. H. Fogwell, Scully Steel Products Co., Pittsburgh; vice-president and treasurer, F. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh; secretary, D. Davia, Bethlehem Steel Co., Carnegie, Pa.

City Auto Stamping Co. To Build \$500,000 Plant

TOLEDO—A new \$500,000 plant to house its die division will be built this summer by City Auto Stamping Co., it was announced to stockholders by Amos Lint, president, at the annual meeting. The company has occupied rented quarters but size of automotive dies has increased so much in recent years that greater space is required to handle them. Bids will be taken and construction started in about 60 days, it was said.

Standard of Ohio Builds New Pipeline

TOLEDO—The Standard Oil Co. of Ohio is building a new 10-in. pipe line to its marine terminals here to supplement its two 8-in. lines. Storage capacity for crude oil is being increased by about 4,000,000 gal. Shortage of tankers for movement of oil from Gulf ports to Canadian points is believed opening up a new route by pipeline and lake tanker.

Treadwell Now Building Lead Lined Tank Cars

THE Treadwell Construction Co., 638 South Twelfth Street, Midland, Pa., is now fabricating homogeneously lead lined tank cars for the chemical industry exclusively for the account of the National Lead Co. These tank cars, which are built in accordance with the regulations of the Interstate Commerce Commission, are of riveted construction, 73½ in. diam-

eter and 32 ft. in length, with ellipsoidal heads. The tanks have a capacity of 7000 gal., and among the special features is an acid dome equipped with the latest safety appliances. The method of homogeneously bonding the lead lining to the steel tank is said to prevent the lining from becoming separated from the steel shell due to vibration of the unit while in service. These car tanks are manufactured for either vacuum or pressure service.

The "order and pray" system

seldom cuts the cost of forgings

TEAMWORK—in baseball, is exemplified by the hit and run play—in business, by the delivery of exactly what is wanted, where it is wanted, and when it is wanted. Teamwork between supplier and customer begins with an understanding of the customer's requirements and contemplates the problems relating to each operation in fabricating and finishing a forging. Teamwork requires more than lip service to be practical. Teamwork that bestows tangible benefits is obtainable only when the objective is lowest cost at the point of assembly, rather than lowest price at the point of delivery. The "order and pray" system usually

sacrifices teamwork for a lower price, risks interrupted production schedules, and disregards cost at the point of assembly. Hundreds of users of forgings are recipients of the benefits of T & W teamwork—lower costs at the point of assembly. You are invited to join this group on your next forging job.



**USUALLY COST LESS
AT THE POINT OF
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TRANSUE & WILLIAMS
STEEL FORGING CORPORATION
ALLIANCE, OHIO

Sales Offices: New York, Philadelphia, Chicago, Indianapolis, Detroit and Cleveland

Shipbuilders' Purchases Will Amount to \$585,000,000

AT the annual meeting of the National Council of American Shipbuilders, held in New York, April 18, H. Gerrish Smith, president, pointed out that the contracts for 141 commercial vessels placed with private shipyards by the Maritime Commission during 1938 and 1939, coupled with new naval ships now under construction, involve an expenditure of approximately \$585,000,000 for mate-

rials, parts, etc., purchased or to be purchased from industries other than shipbuilding companies. These purchases are being broadly distributed throughout the country.

The aggregate tonnage of unfinished commercial ships at the end of 1939 was 1,120,000, the largest tonnage of merchant vessels ever under construction in the United States at one time with the exception of the period of the World War.

At present, the full Maritime Commission program of ships building or

delivered involves contracts for 147 vessels, six high speed tankers having been added since the beginning of the year. Of this program, 43 vessels have been launched. Thirty of these have been delivered.

In addition to the program of the Maritime Commission there are now under construction solely for private accounts 32 seagoing vessels of about 325,000 gross tons as well as a great number of miscellaneous small craft.

New Production Index For Pittsburgh Industry

PITTSBURGH—One hundred industrial firms here will soon have the benefit of a composite production index and forecast. Cooperating with the Bureau of Business Research of the University of Pittsburgh and the Chamber of Commerce, important industrial firms will embark on a new statistical enterprise which will include a composite production index for the previous two months, the first 10 days of the month in which they receive the report, and a careful estimate of the companies' expectations for the coming three months.

Aside from the production index, reporting firms will furnish data on inventories, new orders, and unfilled orders.

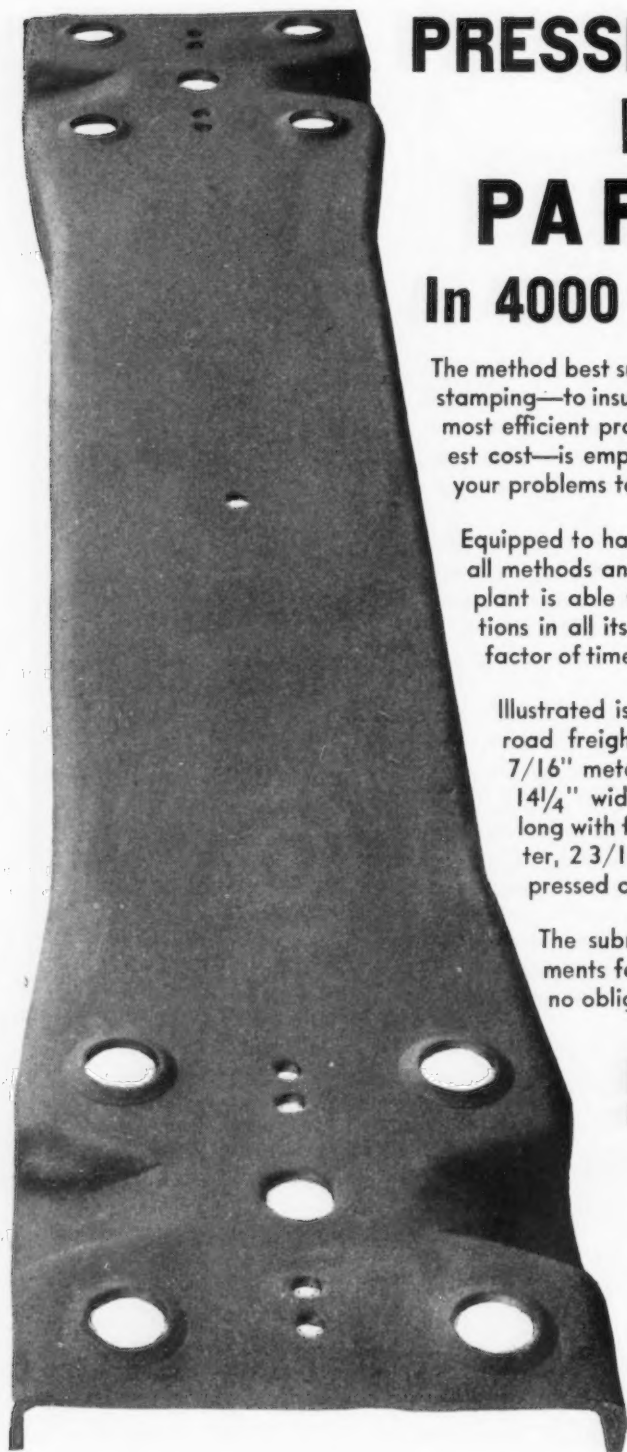
According to Bernard Nichols, editor of the University of Pittsburgh's *Pittsburgh Business Review*, the results of these studies will not be made public at the present time but will be utilized by reporting firms.

Austin S. Chave, economist and sales analyst, formerly with Republic Steel Corp. and Pittsburgh Steel Co., is associated with the new enterprise.

290,000 Tons of Steel Needed for Low-Rent Homes

WASHINGTON—The United States Housing Authority fixes 290,000 tons as the steel requirements that will be utilized in its present program for 160,000 low-rent homes which it estimates can be financed from its original \$800,000,000 loan fund. Among other estimated items are 500,000 steel windows, approximately \$15,000,000 for electrical materials and fixtures and about \$24,000,000 for heating and ventilating equipment and materials.

Like all Government bureaus, US HA has the expansion urge and now has in Congress an amendment for additional loan funds which would virtually double the existing program.



PRESSED COLD by PARISH In 4000 ton Press

The method best suited for each particular stamping—to insure most effective results, most efficient production and most modest cost—is employed when you present your problems to the Parish plant.

Equipped to handle all types of work in all methods and sizes of stamping, our plant is able to meet your specifications in all its elements, including the factor of time.

Illustrated is a Spring Plank for railroad freight car trucks. Made of 7/16" metal—16 5/8" wide at ends, 14 1/4" wide at center, and 93 1/4" long with flanges 3 3/8" high at center, 2 3/16" high at ends—it was pressed cold from heavy steel.

The submission of your requirements for review involves you in no obligation.

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Redistribution of Wealth New Deal Aim, Says Utley

CLEVELAND—S. Wells Utley, Detroit Steel Castings Corp. president, told a City Club audience here that "the basic thought of the New Dealers has concerned itself, not with the creation of new wealth so that there might be more to divide, but rather with the redistribution of that which already exists—the same mistake which has destroyed the civilizations which preceded ours.

"The keynote of their song has been the condemnation of those who have been successful and the exaltation of those who have been unsuccessful.

"I am not suggesting that anyone should be allowed to starve when I suggest that, whenever the people come to believe society will support them without work, that society is doomed."

Canadians Buying American Vessels

TOLEDO — Canadian interests have been buying American ships and it is presumed some may be converted into tankers. The steamer *Howard M. Shaw* and barge *Bryn Mawr*, both formerly owned by the Pittsburgh Steamship Co., and wintered here, have been turned over to Canadian crews and will be taken to Collingwood, Ont., shipyards for some changes.

Donnelly Company to Build New Plant

CLEVELAND—A new plant for a new line of manufacture for the Donnelly Pattern & Engineering Co. at Braden and Michigan Avenues, Detroit, will be built by the Austin Co., engineers and builders. Approximately \$100,000 will be spent for plant and equipment. Contracts for an \$80,000 building for the United Stove Co., Ypsilanti, Mich., have been awarded to the Austin Co.

General Electric Sales 25% Over 1939 First Quarter

SCHENECTADY, N. Y. — Sales billed by the General Electric Co. during the first quarter of 1940 amounted to \$85,949,194, compared with \$68,537,269 during the same quarter last year, an increase of 25 per cent, Charles E. Wilson, president, announced to stockholders.

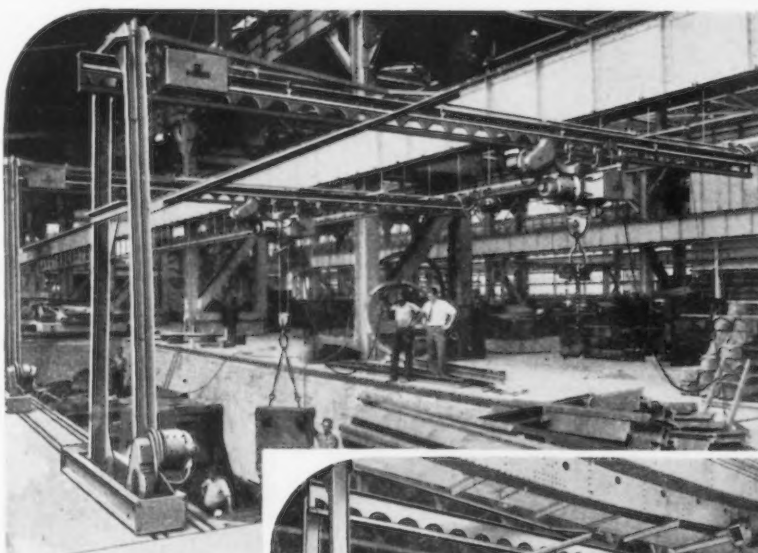
Heil Co. Starts Production Of Home Air Conditioning

MILWAUKEE—The Heil Co. has started production on a new package unit oil burning, direct fired air conditioning installation, designed to meet the requirements of the average small home. The new model will occupy a floor space of 26 by 43 in., is 57 in. high, and can be installed in a few hours. A replaceable air filter and automatic humidifier are features.

Baldwin Gets \$1,350,000 Order From TVA

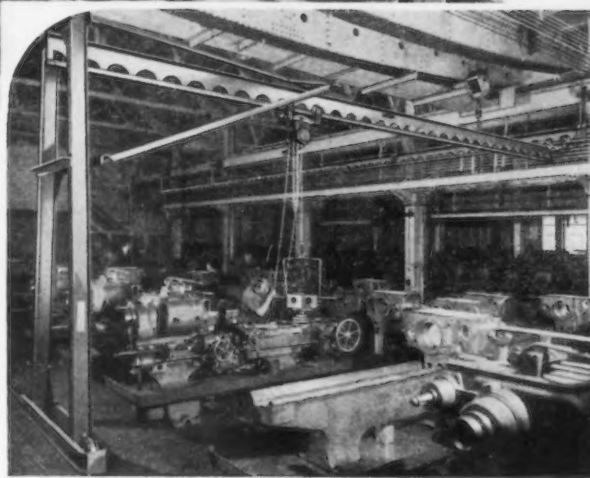
THE Tennessee Valley Authority has awarded a contract to Baldwin Southwark division of The Baldwin Locomotive Works covering three 42,000 hp. adjustable-blade Kaplan type turbines with governors for the Watts Bar Dam in Tennessee.

The total value of the order is estimated by the TNEC at approximately \$1,350,000.



SINGLE-LEG GANTRY CRANES

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In places where it is undesirable or impractical to use a long-span overhead crane, single-leg gantry cranes fill a definite need.

Often they are operated under the large overhead crane to relieve it of light local work. Time lost waiting for crane service is thus greatly reduced.

Single-leg gantries require one overhead runway rail and one floor rail. Available for hand or electric operation in capacities up to five tons.



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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

... THE NEWS IN BRIEF ...

CIO automobile unions win smashing victory over AFL in General Motors elections.—Page 56.

Automobile assemblies pursue steady pace, with totals moderately higher.—Page 58.

David J. Saposs, chief economist, National Labor Relations Board, denies he is a communist.—Page 60.

Rules Committee sends two sets of Wagner Act amendments to House floor.—Page 60.

Licenses for export of \$15,765,195 of aircraft to Canada issued in March.—Page 62.

Railroads should spend a half billion a year for equipment, says J. J. Pelley.—Page 62.

Public Contracts Board reports \$132,646,441 of iron and steel products bought by Government since Walsh-Healey Act became effective.—Page 62.

War has greatly stimulated exports of tin plate from United States.—Page 63.

Recently discovered bauxite ore deposits in Brazil may permit exports from that country.—Page 63.

Heavy house vote for Logan-Walter bill (279 to 97), intended to limit power of New Deal agencies, may help measure in Senate.—Page 64.

Douglas Aircraft Co., Santa Monica, Cal., now employs 16,000 men; payroll \$490,000 a week.—Page 66.

Bureau of Mines finds that iron and steel scrap stocks were higher at the end of 1939 than they were in September.—Page 68.

Large allied aircraft orders placed in U. S.—Page 70.

Jerome Frank, SEC chairman, denies financing of small business is hampered by that agency.—Page 70.

Government contracts for iron and steel, non-ferrous metals and machinery for week ended April 13.—Page 70.

Building construction contracts in first quarter only slightly above those of a year ago.—Page 72.

Editor warns other nations plan post-war trade expansion.—Page 73.

American Foundrymen's Association announces award of 1940 gold medals.—Page 73.

Welding clinic to be held in Chicago, May 16 and 17.—Page 74.

Society of the Advancement of Management discusses industrial problems at Cleveland meeting.—Page 74.

Lincoln Electric Co. publishes enlarged edition of "Procedure Handbook of Arc Welding Design and Practice."—Page 75.

Pittsburgh Foundrymen's Association elects R. C. Heaslett president.—Page 75.

American Steel Warehouse Association chapters elect officers.—Page 76.

Resistance Welder Manufacturers Association announces prize contest for technical papers on welding.—Page 76.

Space reservations for National Metal Congress and Exposition at Cleveland, Oct. 21, largest in the society's history.—Page 76.

City Auto Stamping Co., Toledo, to build \$500,000 plant.—Page 77.

Standard Oil Co. of Ohio builds new 10-in. pipe line to Toledo marine terminals.—Page 77.

Treadwell Construction Co. starts production of homogeneously lead-lined tank cars for chemical use.—Page 77.

New production index for Pittsburgh industry.—Page 78.

Shipbuilders' purchases from other companies for present shipbuilding program will amount to \$585,000,000.—Page 78.

U. S. Housing Authority estimates that 290,000 tons of steel will be utilized in contracts for 160,000 low-rent homes.—Page 78.

Redistribution of wealth is real aim of the New Deal, says S. Wells Utley.—Page 79.

Heil Co., Milwaukee, starts production of air conditioning unit for homes.—Page 79.

New plant for Donnelly Pattern & Engineering Co. to be built at Detroit.—Page 79.

Canadians buy American ships, some for possible conversion into tankers.—Page 79.

Baldwin Locomotive Works awarded \$1,350,000 order by Tennessee Valley Authority.—Page 79.

General Electric Co.'s sales in first quarter 25 per cent over those of corresponding 1939 quarter.—Page 79.

Foreign machine tool orders have ceased, but orders for machine tools from aircraft builders with new Anglo-French contracts are beginning to come through in large volume. Allied shell business placed in the East. General buying holding up well in many districts, though little improvement is seen in deliveries.—Page 107.

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MEETINGS

April 26 and 27—Concrete Reinforcing Steel Institute, 16th annual meeting, Hot Springs, Va.

May 1 to 3—American Society of Mechanical Engineers, spring meeting, Worcester.

May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 7 and 8—Society of Automotive Engineers, national production meeting, Hartford.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 21 and 22—American Steel Warehouse Association, annual convention, New York.

May 23—American Iron and Steel Institute, annual meeting, New York.

June 3 to 6—Annual international convention and Inform-a-Show, National Association of Purchasing Agents, Cincinnati.



41-Passenger Mack Bus with structural members of "A.W." DYN-EL high strength steel.

Mack builds lighter and stronger . . . Reduced dead weight . . . faster schedules . . . safe, economical transportation. "A.W." Dyn-el high strength steel plays an important part in the construction of Mack Buses for 1940. Mack eliminates every unnecessary pound of weight with "A.W." Dyn-el. With all its lightness, Dyn-el is stronger than conventional steel, longer lasting and has greater resistance to shock, fatigue and corrosion. *Fewer pounds of steel to buy means fewer pounds of steel to move.*

The 48-page book, "A.W." Presents Dyn-el, gives full details of savings in weight and cost possible with this new high-strength, flat-rolled steel. Write for a copy.

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MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. :: SINCE 1826 :: DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, New Orleans, St. Paul, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal—A. C. Leslie & Co. PRODUCTS INCLUDE—Steel Products in Carbon, Copper or Alloy Analyses :: Sheared Steel Plates :: Hot Rolled Sheets and Strip :: "A.W." Rolled Steel Floor Plates :: Billets, Blooms and Slabs :: "Swede" Pig Iron :: Reading Cut Nails.

New War Orders of \$100,000,000

TORONTO—New war orders totaling upward of \$100,000,000 are pending and awards will be made immediately. Of this new business, \$35,000,000 has been earmarked for aircraft purchases, with a like sum for shells and munitions for the Allied powers. Since last September

orders amounting to \$70,000,000 have been placed in Canada by the British Supply Board and further contracts aggregating \$17,000,000 will be awarded very soon, according to official statement from Ottawa.

Appropriations for purchase of war materials and other supplies in Can-

ada for Great Britain for the first year of the war is set at \$445,000,000, approximately \$1,250,000 per day. So far, however, only a relatively small portion of this sum has been spent because the war has not resulted in the expected consumption of materials and British production has been uninterrupted. In addition to the proposed British buying in Canada, the Canadian Government has announced a program on war account which calls for outlay exceeding \$1,000,000 a day.

Placing of shell and munitions contracts has become more active recently and large orders have been placed by the British Government for shells with National Steel Car Corp., Hamilton, Ont.; Canadian Car & Foundry Co., Montreal; Dominion Engineering Co., Montreal; and Robert Mitchell Co., Montreal. In most cases orders are sufficient to tax present productive facilities to capacity for at least a year, and further orders would make necessary other additions to equipment at these plants, the majority of which now are engaged in plant expansion.

Hon. C. D. Howe, Minister of Munitions and Supply, Ottawa, stated that Canada's \$50,000,000 wartime ship construction program is proceeding ahead of schedule. At 15 shipyards in various parts of Canada, work is proceeding on 24-hr. schedules to produce more than 100 vessels for naval and air service purposes, he stated. Also a variety of plants throughout the Dominion are working at capacity on shipyard orders, with some 4000 men engaged in the various yards and this number soon will be more than doubled. At present 64 patrol ships and 26 mine sweepers are under construction. Building of some of these ships is well advanced and delivery will start late this year and in 1941. He stated that further orders for eight ships will be placed within a few weeks.

Expanding Canadian Steel Capacity

Difficulty in obtaining steel in connection with shipbuilding has to a large extent been overcome and most yards now have sufficient supplies on hand to meet pressing demands, while new deliveries are being made at regular intervals. While a large part of the steel going into these ships has been ordered from the United States since the beginning of the year, plant



THIS MAN TALKS YOUR LANGUAGE!

He is a Wyandotte Service Representative, and his special job is to help you get results from your metal-cleaning operations.

He has had experience in many metal shops, solving individual problems in various kinds of equipment.

Always his one concern is to keep *production* moving at a maximum while holding *cost* at a minimum.

A card to The J. B. Ford Sales Co., Wyandotte, Michigan, will bring instant service, without obligation.

Wyandotte
THE J. B. FORD SALES CO.  SERVICE REPRESENTATIVES IN 88 CITIES
WYANDOTTE MICH.

Soon to Be Placed in Canada

additions under way at the various steel mills in Canada are expected to be ready to take over a greater part of this ship demand for steel before the middle of the year. In the meantime, however, imports of steel from the United States into Canada are up approximately 100 per cent over pre-war days.

Arthur Cross, president of Dominion Steel & Coal Corp., Sydney, N. S., stated that as result of recent extension to open-hearth equipment the company now is able to produce ingots at the rate of 600,000 tons a year. Various subsidiaries, both in the Maritimes and in Ontario, continue to operate at capacity.

Dominion Foundries & Steel, Ltd., Hamilton, Ont., operated at capacity during the first quarter of this year and results are comparative with the best months of any year, C. W. Sherman, president, stated.

Officials of Canadian Car & Foundry Co., Montreal, report that business booked in the first half of the current fiscal year to April 1 was over 100 per cent greater than that booked in the first half of the preceding fiscal year. Improvement has been general in all departments of the company, including new lines and war activities. During the past week the company received half of the rolling stock award by the Canadian National Railways, totaling \$1,500,000, which will keep the company's car shops busy for some time. Ahead is the prospect for large orders from the Canadian Pacific Railway in connection with its proposed expenditure of \$10,000,000 this year for new rolling stock. The airplane department has been busy on production of planes both for the Canadian and British governments, and in addition the company is participating in production by Canadian Associated Aircraft of some \$40,000,000 of bombers for the British Government. In view of the airplane business at hand and in sight, consideration is being given to further extension of the company's airplane manufacturing facilities both at Fort William, Ont., and Amherst, N. S.

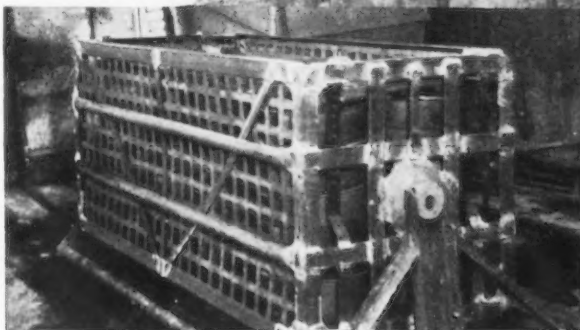
Structural Steel More Active

A gain in construction work is reflected in substantial betterment in demand for structural steel and reinforcing bars. Foundation Co. of Canada, Ltd., 1538 Sherbrooke Street

West, Montreal, has been awarded contract for \$3,000,000 addition to plant of Aluminum Co. of Canada, Ltd., Arvida, Que., for which 1000 tons of structural will be required; 600 tons will be required for hotel at Ottawa for interests headed by Samuel Diamond, 313 Laurier Avenue

East; 400 tons pending for assembly shop for De Havilland Aircraft of Canada, Ltd., Sheppard Avenue, North York Township, Ont.; 300 tons is pending for plant for Bennett, Ltd., Chambly Canton, Que. Structural awards during the week include 500 tons to Canadian Bridge Co., Walker

Handles a 1 1/2 Ton Payload



One of ten welded Monel pickling baskets at plant of National Enameling & Stamping Company, Granite City, Ill.

Made of welded Monel sections, this basket is strong, yet light in weight

How you can boost your payload . . . and thereby cut production costs . . . is well illustrated by this lightweight basket of welded Monel. One of ten baskets used for pickling stamped steel hollow ware before enameling, it weighs 400 lbs., is 30 inches high, 30 inches wide, and 6 feet long.

Will such lightweight baskets stand up in 8% sulfuric acid solution at a temperature of 160° F.? They certainly will! Made of Monel, they resist corrosion, and so retain their strength.

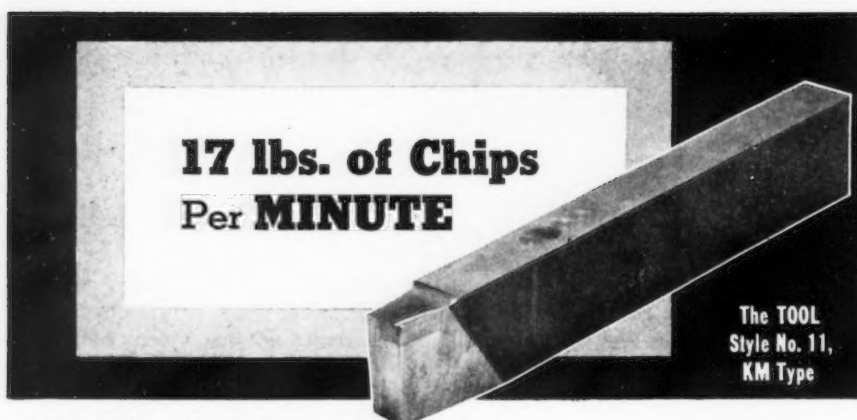
For baskets, crates, chains, tie-rods and other pickling equipment, specify Monel. Write for further information on this long-life pickling metal. Ask for "Equipment Designs for the Pickle House" and "A Good Start to a Better Finish." Address:

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York, N. Y.



MONEL

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.



KENNAMETAL MACHINES STEEL ROLL TABLE ROLL In Record Time

Machining time cut in half . . . one roughing cut eliminated . . . 17 lbs. of steel removed per minute . . . standard production time reduced 4.2 hours per roll produced.

Those were the results obtained in a large Chicago steel mill when KENNAMETAL was used to turn and face the ends of a forged steel roll table roll.

Polishing of journals was greatly simplified . . . because of the smoother finish produced by KENNAMETAL. And size was held to closer tolerance.

This case is not exceptional. Wherever they are used, KENNAMETAL-tipped tools are speeding up production, cutting costs and increasing profits. We will gladly explain how KENNAMETAL can solve your steel-cutting problems. Write:



The CHIPS



From Roughing Cut
(17 lbs. per min.)



From Finishing Cut

QUICK DELIVERIES on Tools and Blanks

KENNAMETAL
Blanks 24 hours

Milled & Brazed
Tools 4 days

Finished Tools . . . 6 days
upon receipt of order



Duriron Steam Jet and Ejector
in rubber-lined tank.

"So what?"

Duriron Steam Jets save money, save time, save steam. They heat, circulate and agitate the pickle liquor. And do it efficiently and economically.

"All right," says you.
"What does that mean to me?"

"A whale of a lot," says we. "And here's why."

If it is your business to see that the steel is pickled satisfactorily, you have to keep your department working efficiently. When production gets heavy, you have to work your equipment harder. The acid pickling bath has to be at a higher temperature to do more work in less time. That puts a greater burden on any pickling department, and especially on the heating and agitating equipment for the pickling tanks.

Duriron Steam Jets can take that

kind of a beating. Run the temperature up above 212° F. if you want to—they can take it. Duriron Steam Jets help you to make your equipment produce more and better work at lower costs. You eliminate shut-downs, you cut down your steam requirements, save money on replacements, and force every bit of acid to do its share of the cleaning job.

For detailed information about Duriron Steam Jets, write for Bulletin No. 1801—it's free.

THE DURIRON COMPANY, Inc., 438 N. Findlay St., Dayton, Ohio

Road, Windsor, Ont., for addition at Ford Motor Co. of Canada, Ltd.; 500 tons to Canadian Bridge Co., Windsor, for work at Copper Cliff, Ont., for International Nickel Co.; 300 tons to Dominion Reinforcing Steel Co., 6894 Clanranald Avenue, for factory for International Braid Co. of Canada, Ste. Rose, Que.; 200 tons to Eastern Canada Steel & Iron Works, Lesage Street, for church at Quebec, Que.

Westinghouse President Sees Encouraging Outlook

GEORGE H. BUCHER, president, Westinghouse Electric & Mfg. Co., told stockholders at the annual meeting of the company that the outlook for business was "very encouraging."

Orders booked by the Westinghouse company during the first three months of 1940, he said, were more than 30 per cent higher than during the same period last year: a total of \$55,250,000 for the first quarter of 1940 as compared with \$50,121,000 in January, February, and March of 1939.

Mr. Bucher also reported that the company's backlog of unfilled orders was approximately \$83,000,000 on March 31, a peak figure in the company's history. The inventory was about \$66,000,000 on that date, as compared with \$53,840,000 on March 31 last year, at which time unfilled orders were \$46,900,000.

New Aluminum Plant Capacity to be Doubled

PITTSBURGH—To care for the heavy consumption of aluminum due to present demands of industry and the Government's preparedness program, Aluminum Co. of America has announced that it had made an additional contract with the Bonneville power administrator which would permit the doubling of the capacity of the new metal producing plant now under construction at Vancouver, Wash.

The new plant now being built at Vancouver will be able to produce 60,000,000 lb. a year instead of the 30,000,000 lb. originally contemplated.

Cuban Ore Exports Up

WASHINGTON—Commerce Department reports show that exports of mineral ore from Cuba, most of which were absorbed by the United States, included iron and chrome ore which registered sharp increases in 1939 over 1938. Exports of magnesite ore, recently discovered in Cuba, totaled 554 tons in 1939.

TNEC to Study Steel Company Railroads

WASHINGTON — Payment by independent railroads of alleged rebates through division of rates to steel company owned railroads will be the subject of hearings to be held soon before the National Temporary Economic Committee, it was said in authoritative quarters Tuesday. In charge of the hearing will be the Federal Trade Commission. Collaborating with it are the Interstate Commerce Commission and the Securities and Exchange Commission. The Federal Trade Commission will present the study at a hearing in connection with its investigation regarding the relative efficiency of large and small business.

Simmons Machine Tool Corp. Building a New Plant

THE Simmons Machine Tool Corp., Albany, N. Y., recently started construction on an addition to its plant, a structure 150 by 400 ft., adjacent to its main offices and rebuilding plant on Troy Road, Albany. The new building, which is expected to be ready for occupancy near the end of June, will be used as a display showroom and warehouse for Simmons products.

This is the fourth time in the 30-year history of the business that Charles A. Simmons, founder and president, has selected the start of a new decade to expand. He began the business in 1910 with two employees and a small store for a shop. In 1920 he moved to his present site on Troy Road with a plant occupying 20,300 sq. ft. In 1930 he expanded this plant to 59,600 sq. ft. and this latest addition will give him an additional 60,000 sq. ft. of space.

U. S. Steel to Register \$75,000,000 of Debentures

UNITED STATES STEEL CORP. planned to file with the Securities and Exchange Commission on April 25 a registration statement covering \$75,000,000 of serial debentures, maturing \$2,500,000 semi-annually Nov. 1, 1940, to May 1, 1955.

Proceeds from the sale will be used, together with approximately \$24,500,000 of the cash funds of the corporation, to redeem or retire on or before July 15, 1940, at 103 per cent plus accrued interest to said date, the \$95,140,000 principal amount of the corporation's 3¼ per cent debentures then outstanding. The public offering is scheduled for May 16.

Made-to-Order

FORGINGS



● Forged carbon-steel shaft; length 21 feet, 10 inches; weight 14,300 pounds.

Standard Steel Works Company

specializes on forgings of unusual design or size to meet the special requirements of the customer.

Good steel, long experience and close control of every step in manufacture, from open-hearth to finished product, assure the satisfactory quality of every Standard forging.

CASTINGS • FORGINGS • WELDLESS RINGS • WROUGHT STEEL WHEELS

STANDARD STEEL WORKS CO.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS
P H I L A D E L P H I A



... OBITUARY ...

JOHN E. WALKER, vice-president of the Eastern Malleable Iron Co., Naugatuck, Conn., died at his home in Cheshire, Conn., on April 17. He became identified with the malleable iron business at an early age, having been employed by the Bridgeport Malleable Iron Co., which was later merged with the Eastern Malleable Iron Co. For a time he was manager of the Wilmington, Del., branch, from which he retired in 1935, continuing on the executive committee and as vice-president of the company.

♦ ♦ ♦

JAMES W. HUME, 61 years old, for the past eight years president of the Harley C. Loney Co., Detroit, automotive equipment distributors, died at Ypsilanti, Mich., on April 9. Mr. Hume, widely known as an inventor and engineer, was responsible for various wheel balancing devices and weights now commonly used on automobiles.

♦ ♦ ♦

SZLO FARKAS, automotive engineer with Packard Motor Car Co. for the last 10 years, was buried April 13 at Detroit. Mr. Farkas, who was born

in Hungary in 1892, went to Detroit 25 years ago and at one time was an engineer for Ford Motor Co.

♦ ♦ ♦

CLIFFORD D. CALDWELL, president of Interlake Iron Corp., Chicago, died last week at his home after an extended period of ill health. Mr. Caldwell went to Chicago in 1914 after he had engaged in banking and coal mining in the East. In 1916 he became vice-president of the By-Products Coke Corp. and was named president in 1921. Eight years later he became president of the Interlake Iron Corp., which succeeded the coke company. He was 67 years old.

♦ ♦ ♦

ANTHONY S. SCHULTE, for the last eight years the superintendent of maintenance for Peninsular Metal Products Co., Detroit, was buried April 15. He was 43 years old.

♦ ♦ ♦

JOSEPH S. WELLS, member of the Chrysler Corp. purchasing department at the Highland Park plant, was buried at Detroit on April 20. Mr. Wells, employed by Chrysler for 16 years, was born in Clinton, N. Y., 64 years ago. He moved to Detroit from Chi-

cago 35 years ago. He had been ill six weeks.

♦ ♦ ♦

THOMAS A. HARRIS, formerly purchasing agent for Murray Body Corp. and later manufacturer's agent for Corduroy Rubber Co., died April 12 while visiting at Sharon, Pa. Mr. Harris, who was 68 years old, had lived in Detroit for 25 years.

♦ ♦ ♦

EDGAR L. MITCHELL, formerly foundry superintendent and sales engineer for the Beardsley & Piper Co., Chicago, died on April 2, aged 51 years.

♦ ♦ ♦

STEPHEN D. FLYNN, associated with the Lincoln-Wayne Pump Co. and the United States Air Compressor Co., was buried April 19 at Bay City, Mich., where he was born in 1894. Mr. Flynn had lived in Detroit for the last 10 years.

♦ ♦ ♦

L. B. GRIMES, founder of Grimes & Harris Co., machinists, died at his home in Leominster, Mass., April 14. He was 94 years old. The business is carried on by his partner, James F. Harris, and son, Roy M. Harris.

H. A. BRASSERT & COMPANY

ENGINEERS AND CONTRACTORS

Offer to the Industry a Specialized Service in Design and Construction, a Service based on long and wide experience by a complete organization

THIS experience provides an intimate knowledge of principles and practices of metallurgical processing and material handling.

It makes available skilful mechanical engineering in accordance with the constantly changing and improving standards of today.

It assures the use of approved methods for rapid, accurate and economical execution of construction.

These three essentials for complete readiness to serve are possessed in an exceptional degree by the Brassert organization.

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GRANITE HOUSE, CANNON ST., E. C. 4 • LONDON

PERSONALS

CHESTER H. LANG, who has been manager of advertising and sales promotion activities since 1932 for the General Electric Co., Schenectady, N. Y., has been named manager of apparatus sales and vice-chairman of the company's apparatus sales committee. ROBERT S. PEARE, president and general manager of the Maqua Co., printing and engraving company affiliated with General Electric, has been named manager of the publicity department succeeding Mr. Lang.

Mr. Lang is a graduate of the University of Michigan and became identified with the General Electric Co. in 1919 as a traveling auditor. Three years later he was made assistant manager of the publicity department. He continued in that capacity until 1926, when he was named comptroller of the budget, a position he held until 1932. In that year he became advertising manager. Mr. Lang served for two years as president of the Advertising Federation of America and later was chairman of the board.

Mr. Peare entered the employ of General Electric as a student in the accounting department shortly after being graduated from the University of Michigan in 1922. During the following four years he served in the advertising and statistical departments, becoming assistant to the chief statis-

tician. In 1926 he was elected secretary-treasurer of the Maqua Co. and three years later he became general manager. He has been president of the company since 1934.

A. C. CUMMINS has been made general superintendent of the Youngstown district operations of Carnegie-Illinois Steel Corp., Pittsburgh, succeeding L. N. McDONALD, who will retire May 1 after 55 years' service with subsidiaries of U. S. Steel Corp.

Mr. Cummins, a graduate of Lehigh University, has been connected with Carnegie-Illinois and the former Carnegie Steel Co. since 1911 when he was an electrical draftsman at the Duquesne, Pa., works. In 1919 he was made superintendent of the electrical department and in 1932 was appointed assistant general superintendent of the plant. A year later he became general superintendent and has been assistant manager of Pittsburgh district operations of Carnegie-Illinois since 1936.

Mr. McDonald was first employed by Carnegie Steel at Edgar Thomson works and was transferred to the Duquesne works in 1890, working in blast furnace operation there for 12 years. He went to the Ohio works at Youngstown in 1902 and in 1908 was given supervision of both the bessemer

and open hearth departments. Mr. McDonald was assistant general superintendent of the Youngstown district works from 1916 to 1925, when he was appointed general superintendent.

GORDON TUTHILL, advertising manager of the Crucible Steel Co. of America, New York, was one of 13 young men selected by the Advertising Club of New York for the honorary society of the Order of the Rake, which is composed of successful young men under the age of 31. Mr. Tuthill is 30. The awards were established a year ago by the young men of the Advertising Club of New York to show by example that opportunities are plentiful for young persons with initiative, perseverance and ability. The other recipients of the awards were in a wide variety of fields of endeavor.

FRANK A. GARVEY, assistant superintendent of Union Drawn division, Republic Steel Corp., Cleveland, has been promoted to superintendent, while WALTER C. GUMPF, former assistant service manager, has become assistant superintendent. Mr. Garvey joined Union Drawn in 1936, after having served as an industrial engineer and production executive in both the automotive and machine tool industries for 15 years. Mr. Gumpf, who has been with Union Drawn 28 years, had been associated with the Beaver Falls, Pa.,



CHESTER H. LANG, new manager of apparatus sales and vice-chairman of apparatus sales committee of the General Electric Co.



ROBERT S. PEARE, manager of the publicity department of General Electric Company.



A. C. CUMMINS, general superintendent of the Youngstown district operations of Carnegie-Illinois Steel Corp.

plant from 1912 to 1919. HARRY L. WILLIAMS has been promoted from the planning department to assistant service manager, succeeding Mr. Gumpf.

♦ ♦ ♦

HERBERT MORLEY has been named plant manager for all Detroit manufacturing units of Norge division, Borg-Warner Corp. He has been manager of the heating and air conditioning division, responsible for engineering, manufacturing and sales. Now he will be responsible for the manufacturing management of the aircraft parts division and the Rollator compressor division, as well as special gears and transmission parts, built for Norge products and for various automotive clients. Mr. Morley was one of the five-man group which HOWARD E. BLOOD, president, brought from the Canadian Products Division, General Motors of Canada, in 1923 to take over the operation of the Detroit Gear & Machine Co. and later form the Norge organization. In 1938 he introduced in the Norge factory a system of process control and inspection which established a high degree of quality and uniformity of product.

♦ ♦ ♦

LOUIS M. BENKERT, associated with Progressive Welder Co. since its organization in 1935 in Detroit, has been named general manager, according to FRED JOHNSON, president. Prior to his connection with Progressive, Mr. Benkert was assistant to Mr. Johnson when the latter was in charge of all



HERBERT MORLEY, plant manager for all Detroit manufacturing units of the Norge Division, Borg-Warner Corp.

welding operations for a division of Chrysler Corp.

♦ ♦ ♦

W. C. SWALLEY has been appointed assistant general sales manager of the Wellman Engineering Co., Cleveland. In addition to handling the sales of the Williams clam-shell and dragline buckets, as in the past, he assumes the broader duties of assisting in the sale of all Wellman engineered equipment.

♦ ♦ ♦

LEE D. HARMONY, for the past 10 years purchasing agent of the Streine Tool & Mfg. Co., New Bremen, Ohio, has been appointed sales manager of the company. He joined the company in 1928 as cost accountant.

J. E. KIEFER, who has been chief engineer for the past four years, has also been placed in charge of all sales engineering for the company. He received his engineering degree from Ohio State University.

♦ ♦ ♦

JAMES C. MORGAN, heretofore general sales manager of the Philadelphia division of Yale & Towne Mfg. Co., has been promoted to the general managership of the entire Philadelphia plant, succeeding WILLIAM R. HOYT.



LOUIS M. BENKERT, general manager of the Progressive Welder Co.

who has been made general manager of the Stamford division. Mr. Morgan first became associated with the company in 1920 to take charge of the company's electric truck sales. Later he was placed in charge of the combined electric truck and hoist divisions.

For a while he was assistant to the president, but returned to guide the materials handling activities of the company. When this division became too large to be handled in Stamford, Conn., it was moved to the Philadelphia plant, with Mr. Morgan as general sales manager.

♦ ♦ ♦

W. L. CRESSMAN, for more than 10 years identified with the New York office of the American Rolling Mill Co., Middletown, Ohio, has been appointed Pittsburgh district sales manager, with headquarters in the Henry W. Oliver Building. He succeeds the late Harry A. Lord. Mr. Cressman joined the company in 1928, soon after graduating from Cornell University as a civil engineer. After taking a sales training course, he went into the Armco general sales offices in Middletown and later was transferred to the New York office.



W. C. SWALLEY, assistant general sales manager of the Wellman Engineering Co.

E. B. GREENE, president, Cleveland Cliffs Iron Co., Cleveland, was awarded the Chamber of Commerce medal for outstanding service to Cleveland during the past year, at the annual meeting of the Chamber, April 16.

♦ ♦ ♦

JOSEPH A. CREEVY, Stratford, Conn., has been named assistant to general manager MEYER YANOWITZ, of Sharon Tube Co., Sharon, Pa.

♦ ♦ ♦

ALLEN N. BENNETT, treasurer and director of the Graton & Knight Co.,

has been made president to succeed **FREDERICK E. BARTH**. Mr. Bennett will retain the treasurership. He has been associated with the leather industry for many years.

♦ ♦ ♦

HUGH B. SCOTT has been appointed assistant vice-president, **Wheeling Steel Corp.**, Wheeling, W. Va. **E. TYLER DAVIS** has been made assistant to the vice-president, **NATHANIEL C. REED**, general manager of sales, with **W. M. HALL** as assistant general manager of sales, and **RICHARD F. SENTNER** as manager of tin plate sales division.



LEE D. HARMONY, sales manager of the Streine Tool & Mfg. Co.

JOHN P. MCWILLIAMS, president of the **Youngstown Steel Door Co.**, Youngstown, and **NEWELL C. BOLTON**, both of Cleveland, were elected directors of the **Youngstown Sheet & Tube Co.**, at the annual stockholders' meeting on April 23. They will fill the board places of the late **Henry C. Dalton** and **George T. Bishop**.

♦ ♦ ♦

P. W. FOSTER, JR., has been appointed manager of the steam division of the **Foster Wheeler Corp.**, New York. **MARTIN FRISCH**, formerly chief engineer of the steam division, has been appointed chief engineer of the corporation.

♦ ♦ ♦

E. H. DIX, JR., chief metallurgist, **Aluminum Research Laboratories**, and **F. C. PYNE**, sales engineer, **Aluminum**

Co. of America, New Kensington, Pa., have returned from an extended tour of aircraft companies on the West Coast, where Mr. Dix addressed a number of engineering groups on the theory and practice of heat treating aluminum alloys.



J. E. KIEFER, chief engineer of the Streine Tool & Mfg. Co., in charge of all sales engineering.

NORMAN L. DEUBLE, formerly identified with **Republic Steel Corp.**, Cleveland, has been made assistant to the vice-president of the **Copperweld Steel Co.**, Warren, Ohio. He is a graduate of the **Case School of Applied Science** in metallurgical engineering and was at one time with the **Central Alloy Steel Co.** and **United Alloy Steel Co.** He is a member of the **American Society for Metals** and of the **Society of Automotive Engineers**.

♦ ♦ ♦

R. B. KANE has been placed in charge of the purchasing department of the **National Twist Drill & Tool Co.**, Detroit, succeeding the late **William Base**. Mr. Kane formerly was in the **Indiana sales territory**.

♦ ♦ ♦

A. L. STRUBLE has been named general sales manager of **Fruehauf Trailer Co.**, Detroit. Mr. Struble, who has been assistant sales manager for the last year, formerly was general sales manager of **Reo Motor Car Co.** and before that was in charge of merchandising for **Federal Motor Truck Co.**



JAMES C. MORGAN, general manager of Philadelphia plant of **Yale & Towne Mfg. Co.**

DON R. LARKIN, resident manager of the **Fisher Body plant** at **Tarrytown, N. Y.**, has been named to be assistant resident manager of the **Pontiac division**, according to **E. F. FISHER**, general manager of the **Fisher Body Division** of **General Motors Corp.** At the same time, other Fisher changes announced were: **CARL E. HOEHN**, resident manager at **Baltimore**, to **Tarrytown**; **EARL L. KLETT**, **Atlanta**,



W. L. CRESSMAN, Pittsburgh district sales manager of **American Rolling Mill Co.**

to Baltimore; H. B. LOWENDICK, Norwood, to Atlanta, and CARL W. MOYER, assistant at Norwood, to become manager there.

♦ ♦ ♦

WILLIAM R. KALES, of Whitehead & Kales Co., Detroit, was given a testimonial for "rare insight, judgment, and unfaltering loyalty to Detroit and his perennial faith in its mounting destiny" as he retired recently from the City Planning Commission of Detroit after 16 years' service on the commission.

♦ ♦ ♦

O. G. HOUSER has been appointed sales representative in the Tulsa district, with headquarters in the Thompson Building, Tulsa, Okla., for Logansport Machine, Inc., Logansport, Ind. He will represent the company in Arkansas, Kansas and Oklahoma, including sections of Texas and Missouri.

♦ ♦ ♦

GEORGE HAAS, of the Stran-Steel division of the Great Lakes Steel Corp., Detroit, has been made sales manager of the division.

♦ ♦ ♦

S. B. WITHINGTON has been named works manager of the Muskegon plant of Brunswick-Balke-Collender Co., succeeding J. O. MATTESON, vice-president and general manager at Muskegon, who has been transferred to new duties at Chicago. Mr. Withington was formerly works manager of the Pontiac Motor Car Co.

♦ ♦ ♦

M. E. STOVER, controller of the Evans Products Co., Detroit, recently was elected treasurer of the company and J. C. GOLDRICK, director of public relations, was made a vice-president.

♦ ♦ ♦

PROF. IVAN C. CRAWFORD, dean of the University of Kansas School of Engineering and Architecture, has been appointed dean of the University of Michigan College of Engineering, effective July 1. He succeeds the late HENRY C. ANDERSON.

♦ ♦ ♦

E. E. MOORE, general superintendent of Gary works, Carnegie-Illinois Steel Corp., is one of 12 Indiana business and industrial leaders who have accepted appointment as faculty associates of the Indiana University School of business. The purpose of the appointments is "to bridge the gap between the world of business and the University campus."

♦ ♦ ♦

HANS ERNST, research director of the Cincinnati Milling Machine Co.,



OTTO C. VOSS, advisory superintendent of the tank and plate shop of the West Allis plant of the Allis-Chalmers Mfg. Co., who has been awarded the 1939 James Turner Morehead Medal sponsored by the International Acetylene Association. Announcement of the award appeared on page 78 of the issue of April 4.

Cincinnati, gave an address on "Machinability" before the members of the Milwaukee chapter of the American Society for Metals at the Milwaukee Athletic Club, April 16.

♦ ♦ ♦

WALTER F. DUNLAP, president of the Klau-Van Pietersom-Dunlap Asso-



ARCHIE CHANDLER, whose appointment as vice-president in charge of sales of the American Pulley Co. was announced in these columns last week.

ciates, Milwaukee advertising agency, was named a director of the James Mfg. Co., Fort Atkinson, Wis.

♦ ♦ ♦

HAROLD L. HEYWOOD was elected chairman of the Milwaukee chapter of the American Society of Technical Engineers at its annual meeting in the Republican Hotel, Milwaukee. FOSTER C. KOEHN is the new vice-chairman.

Brassert Makes Steel Industry Study for Peru

H. A. BRASSERT, head of H. A. Brassert & Co., consulting engineers, is making a preliminary survey of iron and coal deposits in Peru following a request by the Government of that country for an inquiry into the feasibility of establishing an iron and steel industry there.

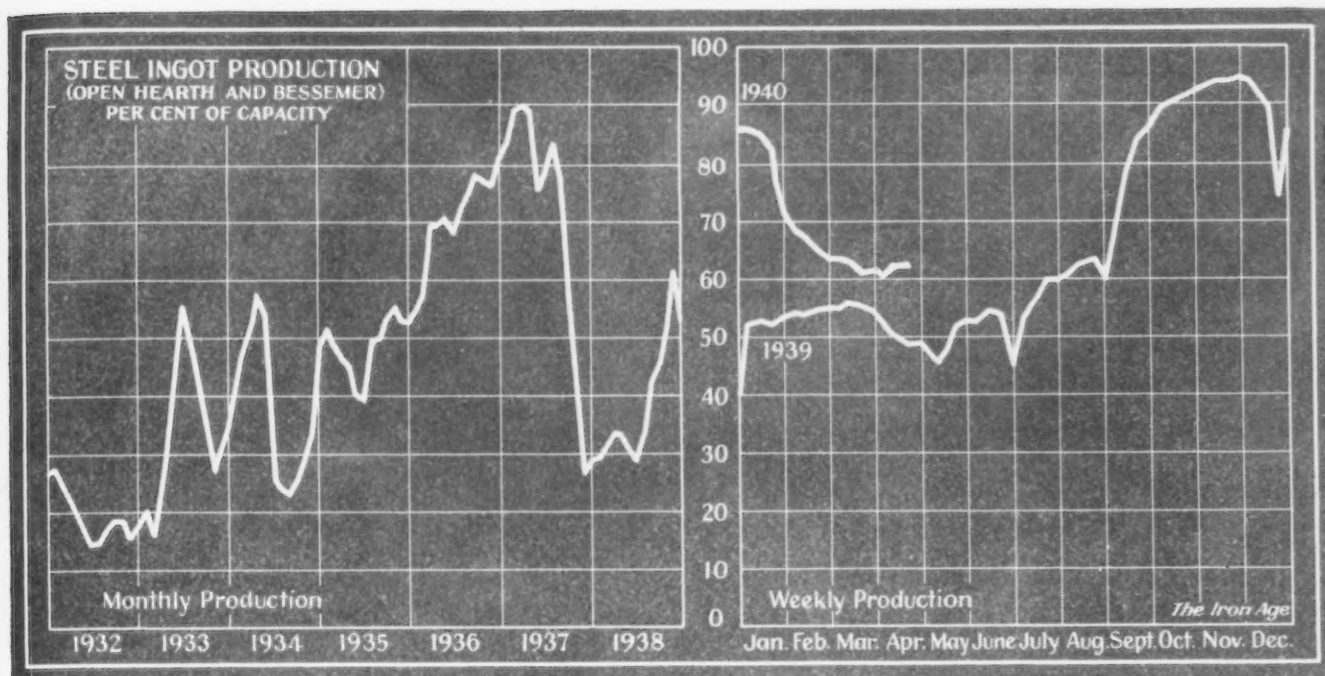
Mr. Brassert, accompanied by Earl Nixon and Charles Cohen, American geologists, is visiting Peru's coastal iron and coal deposits by plane. Later he will visit Brazil and Argentina, where possibilities for expanding domestic industries are also being studied.

N. Y. Machine Tool Dealers Hear Address by Dunbar

REPLACEMENT of obsolete equipment, the search for lower costs and reduction of waste, and the need for equipment to make new products will be the three major phases of machine tool demand following the present unnatural wartime prosperity, Howard Dunbar, vice-president, Norton Co., and past president, National Machine Tool Builders Association, told the regional meeting of the Associated Machine Tool Dealers held April 22 in New York. The machine tool industry can have real prosperity only in peacetime, Mr. Dunbar said.

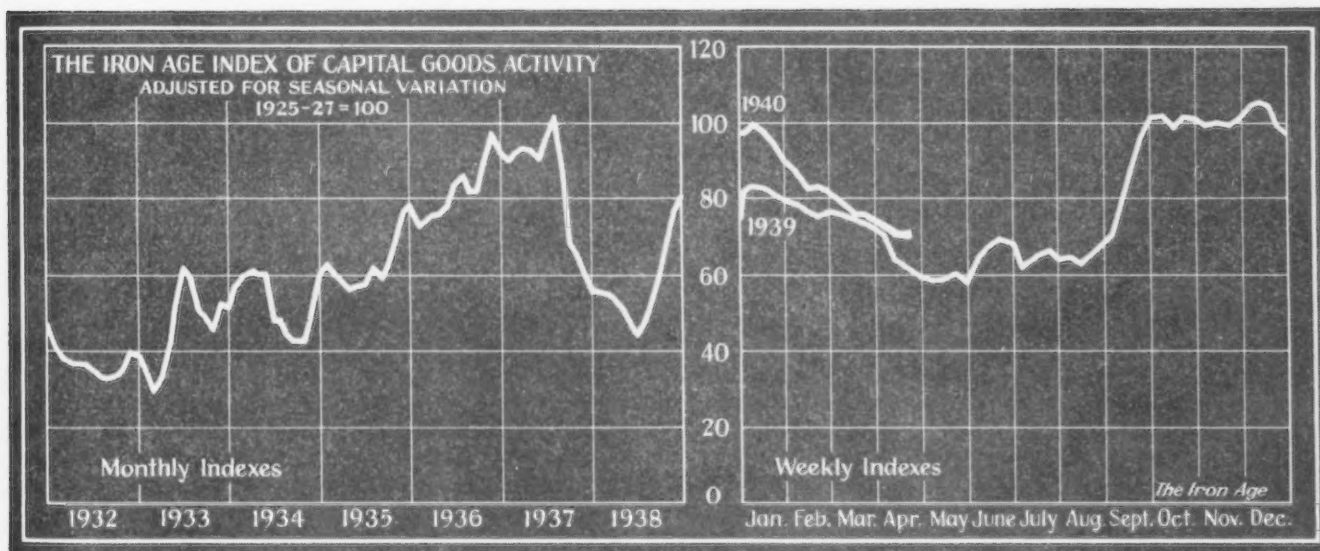
At the dinner, held at the Downtown Athletic Club, F. B. Scott, Jr., of the Syracuse Supply Co. and vice-president of the dealers association, pointed out how local groups of dealers and direct sellers were able in some states like Michigan to obtain exemptions of machine tools from the imposition of sales taxes. John Cetrule, Triplex Machine Tool Corp., told of the problems encountered in connection with the New York City sales tax. Others who spoke briefly were Jack C. Carlton, president, Carlton Machine Tool Co., and Fred L. Eberhardt, president, Gould & Eberhardt. Dan Harrington, general manager, Wilson-Brown Co., presided.

Ingot Rate Remains at 62% of Capacity



District Ingot Production, Per Cent of Capacity		Pitts- burgh	Chicago	Valleys	Phila- delphia	Cleve- land	Buffalo	Wheel- ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East- ern	Aggre- gate
CURRENT WEEK..		57.0	57.0	49.0	69.0	67.0	47.0	64.0	73.5	81.5	59.0	70.0	37.5	50.0	62.0
PREVIOUS WEEK..		56.0	61.0	50.0	66.0	64.0	41.0	65.0	73.5	77.0	47.5	70.0	45.0	60.0	62.0

Index Still Reflects Uncertain Production Trends



THE trend of production of durable goods continues to reflect the general feeling of uncertainty prevailing throughout the nation and current output, while not indicating any sharp recession from recent levels, nevertheless gives no indication of any immediate improvement. THE IRON AGE index of capital goods activity, reflecting this condition, lost 0.7 point in the past week, bringing the index down to 71.9 per cent of the base years, the lowest point reached thus far this year and comparing with 72.6 in the previous week. The steel output series was a little higher in the week, but all other components of the index moved downward. The dollar value of building awards was up slightly in the week, but application of the seasonal corrective resulted in a small decline in the

final, adjusted index number. This situation also applied to automobile production.

	Week Ended Apr. 20	Week Ended Apr. 13	Comparable Week	
Steel ingot production ¹	79.8	77.7	1939	1929
Automobile production ²	84.1	86.3	63.4	126.2
Construction contracts ³	56.6	57.2	72.6	127.2
Forest products carloadings ⁴	55.4	56.5	78.3	134.8
Production and shipments, Pittsburgh District ⁵	83.8	85.5	51.6	123.3
Combined index	71.9	72.6	63.2	127.4

Sources: ¹ THE IRON AGE; ² Wards Automotive Reports; ³ Engineering News-Record; ⁴ Association of American Railroads; ⁵ University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ended April 13. Other indexes cover the week of April 20.

... SUMMARY OF THE WEEK ...

... Sheet and strip prices not likely to be immediately withdrawn.

o o o

... Any action taken probably will come in third-quarter announcements.

o o o

... April volume slightly ahead of March; scrap prices stronger with rise in composite.

NO immediate withdrawal of the lower prices on sheets and strip seems to be in prospect, although some steel companies drummed up a moderate volume of new business last week on the strength of statements to buyers that such action was imminent.

What is likely to happen is a continuance of present quotations for shipment through the second quarter until the time comes for announcement of third quarter prices. Whether the recent concessions will then be withdrawn wholly or in part probably will depend upon business conditions in late May or early June.

While some users of sheets and strip have availed themselves of the opportunity to make commitments at the lower prices for shipment by June 30, there has been nothing resembling the pell-mell rush to cover that occurred when sheet and strip prices declined sharply in May of last year.

If a price advance is put into effect for the third quarter, specifications may be fairly heavy late in this quarter and probably would be reflected in steel operations in June.

Satisfaction is expressed by steel companies that the cuts have gone no deeper and that other products have not been seriously affected, notwithstanding the expectation among a good many buyers that the price weakness might spread. Reports of concessions greater than \$4 a ton on sheets have generally been traced to the fact that the \$2 a ton differential heretofore granted by operators of hand mills has been extended in the present situation.

Other elements of price weakness are traceable largely to secondary markets, products affected being, as heretofore, fabricated structural steel, reinforcing bars, pipe and merchant wire products. A late spring and heavy stocks in distributors' warehouses have contributed to this situation. A mill price change is the waiving of an extra of 10c. a 100 lb. for merchant bars in certain specified lengths.

Pig iron buyers have been sounding the market to determine whether the reduction of 50c. a ton on Lake Superior ore would result in a corresponding decline

of \$1 a ton on pig iron, but thus far there has been no indication that such would be the result. While domestic pig iron business is only moderately active, export prospects are more promising. Great Britain, Belgium and Yugoslavia have sought iron here, and some orders have resulted. Among recent inquiries are lots of 10,000 to 15,000 tons.

STEEL operations are holding their own. The ingot rate for the industry this week is estimated at 62 per cent, unchanged from last week. There have been losses in some districts and gains in others. At last the scrap market seems to point to the expectation of some improvement in steel production. No. 1 heavy melting steel is 50c. a ton higher at Cleveland and Youngstown and 25c. at Buffalo and St. Louis, while a Chicago gain of 12½c. raises THE IRON AGE scrap composite 5c. to \$16.13, the second small advance in two weeks following months of decline. Foundry grades are also stronger in some districts.

Export tonnage continues to be a substantial factor in current mill operations. While the export trade outlook is less promising for the immediate future, steel companies have backlogs of unshipped orders. The Scandinavian market has, of course, been cut off, and, if Italy enters the war on the side of Germany, shipments to Mediterranean countries might be restricted or stopped entirely. Japan's purchases are limited by credit considerations, while some South American countries are fairly well stocked. A long-range is that Norway will come to the United States for considerable tonnages if the Germans are driven out. Meanwhile, American steel companies have the problem of storing steel that was on ships or on docks when Denmark and Norway were invaded.

THE shipbuilding industry here is experiencing a war boom. In addition to the already large number of ships previously contracted for, a number of new orders have been placed. The Matson Navigation Co., San Francisco, has ordered two ships from Federal Shipbuilding & Dry Dock Co. and two from Newport News Shipbuilding & Dry Dock Co., which will take about 20,000 tons of steel, and the Maritime Commission has placed three ships, requiring 12,420 tons of steel, with the Bethlehem Steel Co. for the Mississippi Shipping Co., New Orleans, and two tankers, requiring 10,280 tons of steel, with the Sun Shipbuilding Co., for the Keystone Tankship Corp., Philadelphia. The Sinclair Refining Co. is taking bids on 10 tankers and other oil companies are expected to buy a considerable number of oil ships. An expansion in domestic laying of oil pipe lines is aiding pipe business.

Steel orders in the aggregate are running about 10 to 25 per cent ahead of the March volume. That steel business is not much better than it is, is due largely to a definite lag in building construction and railroad requirements.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Apr. 23, 1940	Apr. 16, 1940	Mar. 26, 1940	Apr. 25, 1939
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleveland, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	1.90	1.90	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.60	2.60	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	1.90	1.90	2.10	2.15
Cold rolled sheets: Chicago, Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	2.85	2.85	3.05	3.20

Cents Per Lb.:

	Apr. 23, 1940	Apr. 16, 1940	Mar. 26, 1940	Apr. 25, 1939
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	\$5.00

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	\$24.84	\$24.84	\$24.84	\$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh.	\$16.25	\$16.25	\$16.75	\$14.75
Heavy melting steel, Phila.	16.75	16.75	16.75	15.50
Heavy melting steel, Ch'go.	15.375	15.25	15.375	12.75
Carwheels, Chicago	17.00	16.75	16.75	12.50
Carwheels, Philadelphia	20.25	20.25	20.25	16.25
No. 1 cast, Pittsburgh	17.75	17.75	18.25	15.25
No. 1 cast, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Ch'go (net ton)	15.75	14.75	13.25	11.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	\$4.00	\$4.00	\$4.00	\$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
*Copper, electrolytic, Conn.	11.50	11.50	11.50	10.00
Copper, lake, New York	11.50	11.50	11.50	10.25
Tin (Straits), New York	47.50	47.25	46.00	48.25
Zinc, East St. Louis	5.75	5.75	5.75	4.50
Zinc, New York	6.14	6.14	6.14	4.89
Lead, St. Louis	5.10	5.10	5.15	4.60
Lead, New York	4.95	4.95	5.00	4.75
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

*Mine producers only.

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

	2.211c. a Lb.
April 23, 1940	2.261
One week ago	2.261
One month ago	2.286
One year ago	2.286
Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.	
	HIGH LOW
1940.....	2.261c., Jan. 2; 2.211c., Apr. 16
1939.....	2.286c., Jan. 3; 2.236c., May 16
1938.....	2.512c., May 17; 2.211c., Oct. 18
1937.....	2.512c., Mar. 9; 2.249c., Jan. 4
1936.....	2.249c., Dec. 28; 2.016c., Mar. 10
1935.....	2.062c., Oct. 1; 2.056c., Jan. 8
1934.....	2.118c., Apr. 24; 1.945c., Jan. 2
1933.....	1.953c., Oct. 3; 1.792c., May 2
1932.....	1.915c., Sept. 6; 1.870c., Mar. 15
1931.....	1.981c., Jan. 13; 1.883c., Dec. 29
1930.....	2.192c., Jan. 7; 1.962c., Dec. 9
1929.....	2.236c., May 28; 2.192c., Oct. 29

Pig Iron

	\$22.61 a Gross Ton
	22.61
	22.61
	20.61
Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern Iron at Cincinnati.	
	HIGH LOW
\$22.61, Sept. 19;	\$20.61, Sept. 12
23.25, June 21;	19.61, July 6
23.25, Mar. 9;	20.25, Feb. 16
19.73, Nov. 24;	18.73, Aug. 11
18.84, Nov. 5;	17.83, May 14
17.90, May 1;	16.90, Jan. 27
16.90, Dec. 5;	13.56, Jan. 3
14.81, Jan. 5;	13.56, Dec. 6
15.90, Jan. 6;	14.79, Dec. 15
18.21, Jan. 7;	15.90, Dec. 16
18.71, May 14;	18.21, Dec. 17

Steel Scrap

	\$16.13 a Gross Ton
	16.08
	16.29
	14.33
Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.	
	HIGH LOW
\$17.67, Jan. 2;	\$16.04, Apr. 9
22.50, Oct. 3;	14.08, May 16
15.00, Nov. 22;	11.00, June 7
21.92, Mar. 30;	12.92, Nov. 10
17.75, Dec. 21;	12.67, June 9
13.42, Dec. 10;	10.33, Apr. 29
13.00, Mar. 13;	9.50, Sept. 25
12.25, Aug. 8;	6.75, Jan. 3
8.50, Jan. 12;	6.43, July 5
11.33, Jan. 6;	8.50, Dec. 29
15.00, Feb. 18;	11.25, Dec. 9
17.58, Jan. 29;	14.08, Dec. 3

... THIS WEEK'S MARKET NEWS ...

STEEL OPERATIONS

... Gains and losses offset each other, leaving rate unchanged at 62%

ALTHOUGH some open-hearth furnaces in the Ohio River Valley were shut down early this week because of threatened flood, the furnaces were quickly put back into operation.

There have been some gains and some losses in operations by districts. PITTSBURGH is up one point to 57 per cent, but CHICAGO is off four points to 57 per cent. Other gains were in the CLEVELAND-LORAIN district, which is up three points to 67 per cent, and in the BIRMINGHAM district, which is now operating at 81½ per cent. Losses other than at CHICAGO occurred in the YOUNGSTOWN, BUFFALO, WHEELING-WEIRTON and ST. LOUIS districts.

NEW BUSINESS

... April tonnage running 10 to 25% ahead of March

STEEL bookings at PITTSBURGH rose moderately in the past week with indications that further increases will be registered next week. April volume is running from 10 to 25 per cent ahead of March bookings. Although export business is not quite as strong as it was earlier in the month, foreign orders so far this month are substantially ahead of the volume booked in March.

After a few days' hesitation following the break in sheet prices, domestic demand has resumed the slight upward trend noted a few weeks ago. Because the volume of flat rolled orders at PITTSBURGH during March was relatively low, comparisons on bookings so far this month are not clear cut; however, there has been a substantial pickup in sheet and strip business during the past three weeks. Miscellaneous consumers are beginning to send in specifications for shipment by June 30 at the new low flat rolled steel prices. Orders at PITTSBURGH in the past week have been sufficient to support slightly more than 50 per cent of ingot capacity.

At CHICAGO, incoming business is but little changed from a week ago, in spite of last week's excitement in covering at the \$4 a ton reduction on sheets and strip. Though many actual orders were placed at the lower levels, most customers contented themselves

with entering blanket orders minus specifications. As the quarter draws on, it is possible that sheet tonnages will become quite large as buyers seek to make use of their coverages.

Unless export demand becomes considerably more important than is the case today, many doubt that the next few months will bring forth much new interest for steel. Final buys on 1940 models and initial purchases for 1941 cars are normal expectations from the automobile industry at this time of year. Agricultural machinery plants are awaiting replacement orders from dealers now that spring weather is likely to put the farmer in the mood to improve his operating equipment. Tin plate demand and production continue good at CHICAGO.

Steel orders at CLEVELAND this month are ahead of the identical March period by a substantial margin. All types of consumers have been in the market, many induced to place business by the \$4 per ton reduction in sheets and strip. Mills are pressing for definite sizes and instructions on this low priced tonnage in order to fulfill the June 30 shipping deadline.

Buick is reported to have distributed orders for 1941 frames and axle housings in the CLEVELAND district recently.

Export inquiry remains strong, although shipping is becoming more complicated each day. Several large orders involving tin plate and wire have been held up due to the Scandinavian situation. The necessity for conserving Swedish wire rod supplies in this country has forced some manufacturers of high grade wire to cease quoting on foreign inquiries.

Flat steel in the SOUTHERN OHIO district showed a small improvement during the past week, but other steel items remain unchanged. Warehouse demand is continuing in its improved volume, but there is still margin for further increase.

Circulation of rumors last week that the \$4 price cut in flat rolled products would be withdrawn shortly, resulted in the booking of a few blanket orders by NEW YORK and PHILADELPHIA sellers, but, on the whole, consumers were not inclined to take the rumor seriously. New business in the past week in the East, exclusive of the blanket orders, were slightly better than in the preceding week.

A PHILADELPHIA shipyard has is-

sued releases for part of the requirements of two cargo boats and is also taking bids on requirements, estimated at about 1300 tons of steel, for several small boats.

Sales to Canadian plants, consisting mostly of hull plates, is in moderate volume, with indications that heavier demand may materialize in near future.

Increased private construction of industrial plants and large housing units is encouraging on the Pacific Coast.

Manufacturers of agricultural implements in the Tri-cities of Illinois and in Waterloo, Iowa, are working nights to meet the demand for tractors, and are said to have a backlog that will carry them well into June.

Section SIA of the CHICAGO subway, on which bids will be taken May 9, will require 1750 tons of sheet piling, 1350 tons of reinforcing bars, 150 tons of structural steel, and 216 tons of cast iron pipe.

PRICES

... No immediate withdrawal of low sheet and strip quotations likely

IF the flat rolled steel prices which were in effect previous to the break two weeks ago are restored, it will not be until public announcements of third quarter quotations are made. The usual time for third quarter price announcements is in the early part of June. Whether or not the new low prices are withdrawn depends entirely on market conditions which will exist prior to the third quarter announcements. Meanwhile, practically all flat rolled consumers have assurances that they will be adequately protected on all shipments for delivery by the end of this quarter.

Considerable gratification has been expressed that the sheet and strip price war has not extended below \$4 a ton off. Rumors of lower cuts invariably turn out to be caused by confusion over the hand mill situation.

Bar makers have again revised cutting extras, details on which can be found under "merchant bars." Significant change is the elimination of a 10c. a 100 lb. extra on specified lengths of 10 to 20 ft.

Line pipe prices have been a little weaker than usual recently and sec-

ondary standard pipe quotations continue to exhibit their perennial irregularities. Merchant wire product quotations are facing severe testing in many parts of the country with telling effect, large pobber stocks of merchants wire products being an increasing threat to firm prices. Weaknesses in secondary markets are noted in several sections of the country.

With Lake Superior iron ore prices cut 50c a ton last week for 1940 delivery, reduced mine profits are a certainty, especially since high labor costs, which helped force the ore price advance in 1937, have not changed. The effect of the ore price reduction upon pig iron and steel prices cannot be predicted.

Reflecting the recent reductions in mill prices of flat rolled products, warehouse interests in most districts have announced corresponding decreases of \$4 a ton in list prices. Items affected include hot rolled sheets and strip, cold rolled sheets and strip, enameling sheets and long ternes. In some districts cold rolled flat wire was also reduced.

PIG IRON

... Exporters report inquiries for sizeable tonnages

INQUIRIES for substantial tonnages have been received from foreign buyers in the past week, with Yugoslavia requesting bids on 10,000 tons and both Belgium and Italy seeking substantial tonnages. Orders in 15,000 and 10,000 ton lots have been placed by the British recently. An order booked for Italy is said to be the first obtained by American exporters in that country since the European war began.

Domestic business, however, continues dull, with the 50c. reduction in iron ore prices causing hesitancy in some quarters. Sellers point out that scheduled increases in coal prices will offset to a degree the lower price available to furnaces on ore. Another cost factor to change is the slightly lower Lakes freight rate on ore.

With the preponderant share of iron ore going into steel making instead of into merchant iron, the effect of the new lower Lake Superior ore price might very well amount to nothing, although a certain amount of psychological effect upon pig iron buyers can be expected, CLEVELAND reports.

New business and shipments at PITTSBURGH continue substantially unchanged. Practically all buying is on a hand-to-mouth basis and consumer stocks are not large. PITTSBURGH pro-

ducers insist that the recent cut in ore prices will not result in lower pig iron quotations, although it is true that the pig iron market has not been subject to any substantial testing recently.

Business booked by NEW YORK district offices for the first half of April was equal to that taken in the corresponding period of March while the recent lowering of flat rolled steel quotations, as well as the ore cut, have resulted in more cautious buying at PHILADELPHIA where shipments still are running ahead of a month ago.

As has been the case for several weeks, CHICAGO pig iron and foundry coke shipments last week were about even with those of the previous seven days.

In the CLEVELAND district pig iron buyers show no disposition to step up orders. Producers expect little action until either scrap markets head higher or export demand steps up sharply.

Pig iron demand at BUFFALO continues to run in what is termed reasonably good volume.

At BOSTON the market is quiet, sales consisting of a carlot now and then for mixing purposes.

IRON ORE

... Prices reduced 50c a ton ... Lake freight rates also lower

CONFRONTED with a new condition and convinced that the Lake Superior iron ore base price structure of 1937, 1938 and 1939 was out of line, sellers during the past week reduced quotations by 50c per ton to the lowest level since 1928. The Mesaba non-bessemer grade, 51.50 per cent natural iron content, is now \$4.45 for delivery at Lake Erie ports, per gross ton, during 1940 season.

Pickands, Mather & Co. on April 16 took the lead in announcing the reduction on the basis of sales and later the other principal ore companies stated their intention of being competitive at the new price. On April 20, Oliver Iron Mining Co., subsidiary of U. S. Steel Corp., issued its first public price announcement in which it said it would accept business for 1940 delivery on the \$4.45 basis. Oliver on Jan. 22 started advertising for long or short term ore contracts and at that time it was also learned the company was successful bidder on around 120,000 tons f.o.b. upper lake port for Ford Motor Co. at an unannounced price reported to be below the published ore market. It was not the Ford sale but the new policy of the corporation, which has large reserves, which provided an unexpected implication in the ore mar-

ket. No further sales by Oliver have come to light to date.

Following the ore price reduction, vessel rates on ore were reduced. The rate from head of the Lakes to lower Lake ports alongside dock is now 70c. a ton, a reduction of 10c. from the 1939 season. The rate from Marquette to lower Lake ports is 63c., from Escanaba to lower Lake ports 52½c., and from Escanaba to South Chicago 42c. The unloading rate from hold is 14c. a ton, unchanged from last season. The freight rate reductions bring transportation costs on the Lakes back to the 1936 level, while the base price of iron ore is now 5c. per ton below the 1936 published price.

Effects of the ore price reduction are difficult to predict, although reduced mine profits are a certainty. Mining economies will be forced particularly at shaft mines where operators will be hard put to break even. High wage rates, which were a principal factor in forcing an ore price advance of 45c. in March, 1937, from the \$4.50 level which had prevailed since March, 1929, remain the same.

In ore circles it is generally considered that the Ford sale is a closed matter, although of course the ore hasn't been moved yet. One Ford furnace will be down for repairs for around three months.

The 1939 vessel movement of ore was 45,072,724 gross tons, in close proximity to the 44,822,023 tons moved in 1936. Pig iron prices today are \$1 a ton lower than in early 1937. The preponderant share of iron ore goes into steel making instead of merchant iron.

Consumption of Lake Superior iron ore during March totaled 4,087,767 gross tons, against 4,241,839 tons in February and 3,316,691 tons in March, 1939, according to latest report of the Lake Superior Iron Ore Association. Ore on hand at furnaces and Lake Erie docks April 1 totaled 21,862,302 tons against 25,872,124 tons a year ago. There were 119 furnaces in blast March 31.

REINFORCING BARS

... Awards 4510 tons ... Price situation no better

REINFORCING steel awards of 4510 tons include 1100 tons for high and low pressure pumping stations at Toledo, Ohio.

New reinforcing projects call for 6125 tons. The largest inquiries are 1350 tons for a section of the Chicago subway and 1200 tons at Ocean City, Md., for the Sinepuxent Bay bridge.

SHEETS AND STRIP

... Moderate improvement in bookings has followed price cut

THE realization that the present low prices on hot and cold rolled sheets and strip, enameling sheets, and long ternes may be withdrawn coincident with the announcement of third quarter prices, which is expected to be made around the first of June, if past practice is adhered to, has caused some miscellaneous and small sheet and strip users to begin placing blanket orders and specifications for second quarter delivery.

Previous to the break in flat rolled prices there had been a definite upswing in the volume of new business. This trend was abruptly halted for about a week following public announcement of the lower quotations, but by last Thursday and Friday total sheet bookings began to increase, with a moderate portion of this improvement being attributed to the desire of many consumers to take no chances in case the price is withdrawn by the first of June.

Although there has been no grand rush similar to last May, a buying wave of moderate proportions is expected to develop, as the belief gains strength that these bargain prices will be withdrawn. Meanwhile, producers have told their customers that they will be covered at the present prices on material for second quarter delivery.

CLEVELAND and YOUNGSTOWN producers are pressing for sizes and definite instructions from consumers with a view toward making effective the June 30 shipping deadline on low price tonnage. Considerable confusion arises through the fact non-integrated hand mills are maintaining their \$2 differential on hot rolled pickled. Reports of concessions lower than \$4 per ton off the 2.10c. level proved either unfounded or due to misunderstanding of the hand mill situation.

CHICAGO sellers last week contacted the major buyers of sheets and strip and either actual orders or blanket commitments are now on hand from most of these. Some offices report having entered considerable actual tonnage, while others protected customers primarily. One large producer has set June 1 as the deadline by which time all specifications on blanket orders must be in for shipment by June 30. It is certain that all sheets rolled and shipped this quarter, with the exception of galvanized, will obtain the reduced price. It is doubtful at

present if any mills are oversold on sheets for the quarter, but it is not known what the various blanket coverages will include as the quarter progresses. This week much of the furor about prices being withdrawn has disappeared and, though some coverages are still being arranged, general activity at CHICAGO is light.

Little new sheet business has come into the NEW YORK market as a result of the reduction in prices. One seller estimates that 80 per cent of last week's bookings would have come in anyway, and the remaining 20 per cent was largely open order contracts subject to future specification.

PLATES

... Quick deliveries possible from most mills ... Prices holding

PITTSBURGH plate producers are hopeful for a pickup in railroad freight car business and, although the number of cars ordered since the first of the year nowhere approximates the experience of last fall, the volume nevertheless has not been as low as generally thought. Mills, however, made heavy inroads on backlogs and production schedules are geared fairly close to current bookings, with deliveries being easy.

Fair export inquiry and moderately improved domestic demand provide principal interest at CLEVELAND and YOUNGSTOWN. Plate prices have held steady despite the weakness on hot and cold rolled strip and sheets.

At CHICAGO demand for fabricated plates is improving slowly, mainly on outside projects, and one large fabricator is fairly well occupied. Fabricated pipe is showing a seasonal betterment.

Sales in the PHILADELPHIA area continue to suffer from the general uncertainty caused by the price reductions on sheets and strips, but thus far plate quotations appear to be holding firmly to published levels.

Plate volume has shown a moderate pickup in the NEW YORK district. Some of the business booked has been on an extremely short delivery basis. Some Eastern mills are able to start delivery within a matter of two or three days on fairly sizable tonnages. Tank builders are seasonably active, but otherwise orders are from scattered sources.

Puget Sound Machinery Depot, Seattle, is reported to have obtained contract for the fabrication of pot shells involving 1000 tons for the Aluminum Co. of America plant at

Vancouver, Wash. Tanks for the Richfield Oil Co. at Seattle will take about 1900 tons. Similar projects are reported contemplated at this point by Shell Oil Co. and Wilshire Oil Co.

BOLTS, NUTS AND RIVETS

*... Order volume increasing slowly
... Price situation steadier*

CLEVELAND producers report order volume continues to increase slowly. Consumer inventories are being depleted by degrees. The price structure has been steady and improved in comparison to late February when concessions were noted here and there.

TUBULAR GOODS

... Pipe line demand continues to show improvement

Oil country goods specifications are just about holding their own with the volume placed in the corresponding number of days last month. Jobbers are moving merchant pipe stock out to the consumer at a fairly good clip, which condition is now being reflected in a more rapid flow of standard pipe specifications to producers. Miscellaneous line pipe demand, which has been the mainstay since the first of the year, continues to show improvement. Although some major lines are out of the way, 10, 15 and 20 mile projects have been numerous. Jones & Laughlin Steel Corp. will furnish about 40 miles, or 3000 tons, of 8 and 10 in. pipe for a Dow Chemical pipe line at Freeport, Tex.

WIRE PRODUCTS

... Late spring has retarded sales of merchant items

CLEVELAND reports that with farmers one to four weeks late getting into their fields little hope remains for much merchant wire demand except normal late spring agricultural requirements. Meanwhile, large jobber stocks are a threat to price stability. Already several sections of the nation report serious price weakness in nails. Export markets are taking up some slack and, in addition, producers are benefited by the virtual halting of imports.

Manufacturers wire and rod orders at CLEVELAND so far this month are running about even with March on a

daily basis. Export demand is improving. One leading producer now refuses to quote on piano and music wire for export, due to the necessity of conserving Swedish rods.

RAILROAD BUYING

... Canadian National orders 180 cars ... Other business small

CANADIAN National has ordered 180 cars to cost \$1,500,000, because of increased traffic "due to war conditions." Canadian Car & Foundry Co. was awarded 150 ballast cars and five mail and baggage cars, and National Steel Car Corp. was awarded 25 baggage cars.

Small rail orders and purchases of car wheels and accessories are being made by roads in the CLEVELAND district. Attractive tonnage is in sight from locomotive builders and Eastern car building shops. Nickel Plate road has allocated around 600 tons of structural steel for two bridges in Indiana.

Norfolk & Southern Railroad has ordered 40 rack cars involving about 500 tons of steel from Greenville Steel Car Co. The same road is expected to place orders for 12 caboose cars some time this week. Cincinnati, New Orleans & Texas Pacific is taking bids on 75 covered hopper cars. Philadelphia Transportation Co. has ordered 86 motor coaches from a.c.f. Motors Co.

St. Louis Terminal Railway Association will buy 10 diesel switching locomotives to cost \$700,000 to cooperate with the city in enforcement of the smoke ordinance, and is studying use of smokeless fuel and possible additional purchase of diesel equipment, P. J. Watson, Jr., president, announced.

The Rock Island has ordered on a lease-purchase basis 150 open-top hopper cars from Pullman-Standard Car Mfg. Co. and 60 covered hoop hoppers from General American Transportation Corp.

The Milwaukee Road has ordered on a lease-purchase basis 35 covered

hoppers from General American Transportation Corp.

SHIPBUILDING

... A number of additional boats awarded ... Inquiry for 10 tankers

A LARGE volume of shipbuilding business in oil tankers is expected to result from conditions caused by the war. The Sinclair Refining Co. is taking bids on 10 tankers. Other oil companies are expected to be in the market soon.

The Matson Navigation Co., SAN FRANCISCO, has awarded four ships of the Maritime Commission's modified C-3 design. Two will be built by the Newport News Shipbuilding & Drydock Co. and two by the Federal Shipbuilding Corp. These were private contracts and the bid figures were not given out, but are said to be between \$2,400,000 and \$2,800,000 for each boat. The four ships will take about 20,000 tons of steel.

The Maritime Commission has awarded contracts for two tankers to the Sun Shipbuilding Co. for the Keystone Tankship Corp. These ships will require about 5140 tons of steel each.

The Maritime Commission on Tuesday awarded a \$9,225,000 contract to Bethlehem Steel Co., Sparrows Point, Md., for construction of three ships for the fleet of the Mississippi Shipping Co. of New Orleans.

The vessels, to be used in the Gulf to East Coast of South America service, are identical with three already under construction for the same company, and will require a total of 12,420 tons of steel.

STRUCTURAL STEEL

... Lettings of fabricated work 13,000 tons

FABRICATED structural steel lettings at 13,000 tons are slightly higher than last week, with the bulk in small tonnages.

New structural projects dropped to 6700 tons from 16,600 tons in the previous week. No new inquiries of more than 700 tons are reported.

MERCHANT BARS

... Extra of 10c. on specified lengths dropped ... Demand a shade better

HOT rolled bar sales at PITTSBURGH are running a shade greater in volume than in the corresponding period a month ago. Export demand is an important factor in the current market, as is the small miscellaneous trade. Last week a competitive situation involving cutting extras on bars arose which has been met by all producers. Specified lengths over 240 in. with privilege of shipping not to exceed 10 per cent of the ordered weight of any item in random shorts down to 65 per cent of the specified lengths, and specified length over 240 in. with the privilege of shipping resultant shorts in multiples of 84 in. or less, now take the base price. Heretofore the language was substantially the same except that the limits were for "over 120 in." Specified lengths 120 in. to 240 in. inclusive now take the base price, whereas heretofore bars ordered in lengths "over 120 in." took a 10c. a 100 lb. extra. Specified lengths of 60 in. to 120 in. exclusive now take an extra of 5c. a 100 lb., this item previously having been classed as 60 in. to 120 in., which took the base price. On specified lengths over 240 in. an extra of 10c. a 100 lb. applies. The length limit previously was "over 120 in." On machine cutting, both ends to specified lengths, the extra on 12 in. and under has been advanced from 70c. a 100 lb. to \$1 a 100 lb. These latest changes represent the third time cutting extras have revised since last July and were brought about entirely by the action of some producers in dropping the 10c extra on bars cut to lengths in ranges of 10 ft. to 20 ft.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Apr. 23, 1940	Apr. 16, 1940	Mar. 26, 1940	Apr. 25, 1939	1940	1939
Fabricated structural steel awards	13,000	9,950	7,500	19,200	241,710	315,110
Fabricated plate awards	2,410	4,105	6,670	505	54,415	49,520
Steel sheet piling awards	2,000	1,505	380	0	14,095	18,165
Reinforcing bar awards	4,510	10,500	4,900	4,900	140,230	147,345
Total Letting of Construction Steel. .	21,920	26,060	19,450	24,605	450,450	530,140

What's New in Industrial Lighting Equipment

(CONTINUED FROM PAGE 53)

Textolite Box Switch Line

TEXTOLITE is used in place of porcelain in a new line of standard tumbler switches having T rating for type C loads and supplied by the



General Electric appliance and merchandise department, Bridgeport, Conn. Construction has been simplified. Contacts are definitely positioned by the accuracy of holes molded in the Textolite base. A compression type spring is used for increased strength and durability. Binding screws accommodate No. 12 wire. These switch boxes are available in single and double pole, and three and four way types.

Oil Immersed Lighting Panelboards

OIL - IMMERSED panelboards, using new thermal trip branch circuit breakers have been announced by *Westinghouse Electric & Mfg. Co.* for the protection of lighting circuits in locations exposed to corrosive elements and explosive atmospheres. The new breaker has a compensating bimetal, affected only by the general temperature of the whole tank of oil and the action of this element neutralizes that part of the deflection of the tripping bimetal which is due to general oil temperature. This makes the free end of the latter responsive only to the load current. The breaker

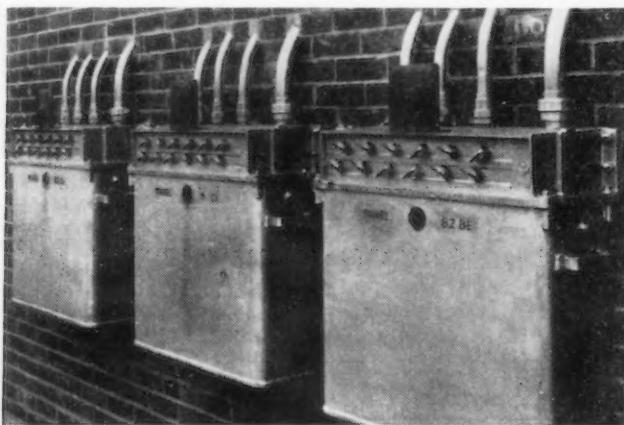
is compensated within commercial limits permitting 0 to 10 per cent decrease in rating when the surrounding oil temperature is 140 deg. F., and 0 to 10 per cent increase in rating at oil temperature of 10 deg. F. At 75 deg. F., the deviation is 0 and at intermediate temperatures the limits are proportionate.

White Bowl Industrial Lamps

WHITE-BOWL industrial lamps in sizes ranging from 150 to 1500 watts, for operation in any position, have been announced by the *Westinghouse Lamp Division*, Bloomfield, N. J. Previously these lamps were designed for base-up burning only, and operation in any other position caused premature blackening. A new formula for the bulb coating eliminates this fault. This line of lamps is designed for industrial uses in RLM direct-lighting reflectors. Coating the bowl reduces the brightness of that part of the lamp, and prevents glare.

Sheet & Tube Earnings For Quarter \$1,253,929

YOUNGSTOWN Sheet & Tube Co., reports consolidated net profit of \$1,253,929 for the quarter ending March 31, 1940, after provision of \$1,904,906 for depletion of minerals and depreciation of plants and after deducting provision for estimated Federal income tax and interest on funded debt and other interest charges. In the quarter ending March 31, 1939, the company reported net profit of \$217,107.



Outlaw Coal Strike At J. & L. Mines Ends

PITTSBURGH—The outlaw strike at Jones & Laughlin Steel Corp.'s coal mines, which had affected approximately 4500 miners, was called off late last week and difficulties are being ironed out with the workers by union officials. The shutdown had been brought about by the picketing of the mines by 140 miners who had been laid off due to installation of mechanical equipment at one of the company's mines.

United Orders Almost Triple Total Year Ago

PITTSBURGH—George T. Ladd, president, United Engineering & Foundry Co., at the stockholders' annual meeting this week, said United's unfilled orders are two and a half times those of a year ago at this time. Mr. Ladd also stated that new roll business was slow but that he expected a pick up soon.

Bindley Is Vice-President Of Pittsburgh Steel

PITTSBURGH—Pittsburgh Steel Co. today reported net profit of \$203,008 for the first quarter of 1940, compared with a net loss of \$377,159 in the corresponding 1939 period. At a meeting of the board of directors, Albion Bindley, general purchasing agent of the company, was elected vice-president of Pittsburgh Steel.

J. & L. Earns \$1,134,611 In First Quarter

JONES & LAUGHLIN STEEL CORP. reports a net profit of \$1,134,611 for the quarter ended March 31, compared with a loss of \$376,525 for the corresponding 1939 period. This also compares with a net profit of \$2,907,755 for the quarter ended Dec. 31, 1939.

Trade Notes

Effective May 1, the name of the Metal Stamping & Mfg. Co., 16816 Waterloo Road, Cleveland, will be changed to Morrison Products, Inc. There has been no change in personnel. In addition to manufacturing stampings and assemblies to customers' specifications, the company makes a line of blowers, drawn steel guards and pulleys and automotive parts for replacement.

Dempsey Industrial Furnace Corp. and its distributing unit, the M. K. Epstein Co., have moved to new and larger quarters at 125 Main Street, Springfield, Mass. The new plant facilities will provide for expansion in the construction of Dempsey furnaces and burners.

...NON-FERROUS...

... Nonferrous buying in light volume ... Weakness develops in outside market copper prices ... March lead shipments gain to 46,353 tons ... Week's spelter sales are 1461 tons.

NEW YORK, April 23—Uncertainty over both domestic and foreign developments continues to restrict sales of non-ferrous metals. The tendency of buyers at the moment appears to be that of buying only to cover nearby operations. As there is no bullish impetus, it is unlikely that any effort will be made in the immediate future to build up heavy inventories. Domestic copper buying was very light all week, with the period's total sales amounting to about 5000 tons. Sales for the month through

Saturday total 27,300 tons, as against 15,400 in the comparable period of March. Producers' prices remain unchanged at 11.50c. per lb., Connecticut Valley, but quotations in the outside market and custom smelters' offerings have grown progressively weaker and at present are in the neighborhood of 11.25c. per lb. Export buyers were fairly active during the week and a number of sales were made at prices averaging about 11.375c. per lb., f.a.s., for prompt shipment. Spot metal for export today was being quoted at 11.25c. to 11.375c., f.a.s.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 17	Apr. 18	Apr. 19	Apr. 20	Apr. 22	Apr. 23
*Copper, Electrolytic ¹	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	47.50	47.50	47.375	....	47.125	47.50
Zinc, East St. Louis ²	5.75	5.75	5.75	5.75	5.75	5.75
Lead, St. Louis ³	4.95	4.95	4.95	4.95	4.95	4.95

* Mine producers' quotations only.

¹ Delivered Conn. Valley. Deduct ¼c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	48.25c.	50.50c.
Copper, Lake	13.25c.	12.625c.
Copper, electro	12.75c.	12.625c.
Copper, castings	12.375c.	12.375c.
*Copper sheets, hot-rolled	20.12c.	20.12c.
*Yellow brass sheets	18.31c.	18.31c.
*Seamless brass tubes	21.06c.	21.06c.
*Seamless copper tubes	20.62c.	20.62c.
*Yellow brass rods	14.26c.	14.26c.
Zinc slabs	7.10c.	7.75c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig	6.10c.	5.50c.
Lead, bar	8.05c.	8.25c.
Lead, sheets, cut	8.25c.	8.25c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	20.50c.	21.50c.
Alum., No. 1 remelt., 98 to 99 per cent	18.00c.	18.50c.
Solder, ½ and ½	29.90c.	29.00c.
Babbitt metal, anti-friction grade	19.85c.	19.00c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33½; on brass sheets and rods, 40; on brass tubes, 33½, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	9.25c.	9.875c.
Copper, hvy. and wire	8.25c.	8.625c.
Copper, light and bottoms	7.25c.	7.75c.
Brass, heavy	5.00c.	5.50c.
Brass, light	4.125c.	4.875c.
Heavy machine composition	7.75c.	8.375c.
No. 1 yel. brass turnings	4.75c.	5.75c.
No. 1 red brass or composition turnings	7.25c.	8.75c.
Lead, heavy	4.00c.	4.375c.
Cast aluminum	7.75c.	8.75c.
Sheet aluminum	13.00c.	14.00c.
Zinc	3.00c.	3.75c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$176 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11.75c. a lb.

Lead

Consumer demand for lead in the past week was very slow, centering chiefly on carlot quantities. This dullness has not yet affected quotations which remain unchanged at 4.95c. per lb., St. Louis. Despite an increase in shipments in March to 46,353 tons from 39,176 in February, stocks at the end of March were 74,692 tons, or 2034 tons higher than at the close of the previous month. The statistics also indicated a small increase in production, but the market was of the opinion that this reflected the conversion of concentrates, rather than an actual gain in mine output. The March shipments were 5482 tons above the corresponding month of 1939 and the highest since November, 1939.

Zinc

The sudden turn-about in spelter demand two weeks ago resulted in sales of only 1460 tons of prime Western metal in the past week, as compared with 19,600 tons in the preceding period. The slackening in buying interest, however, gave consumers more opportunity to consider shipments and the result was a gain in deliveries to 3903 tons from 2882 in the previous week. Quotations remain unchanged at 5.75c. per lb., East St. Louis.

Tin

There was a little more interest evidenced in the market over the past week and trading was more active, but tonnages involved were not very heavy. While the possibilities of a shortage appear remote, supplies of nearby metal are not excessive. This condition is one factor contributing to the steadiness of present quotations. Today's quotation for prompt Straits, New York, is 47.50c., 0.25c. above a week ago and 0.375c. above the week's low. Cash standards in London this morning were priced £253 10s.

J. & L. Wage Cut Due to Mill Improvements Is Upheld

PITTSBURGH—Jones & Laughlin Steel Corp.'s contention that it had the right to adjust its wage rates following the installation of technological improvements, has been upheld by Sheldon C. Tanner, professor of economics and business law, Pennsylvania State College, who arbitrated a controversy between the company and the SWOC.

The controversy arose recently when the company reduced the wage rates in the tin plate temper pass mill although technological improvements resulted in actual increased earnings. The union had protested that the old wage rate should hold, even though the improvements had been made. Arbitrator Tanner set aside the SWOC complaint and upheld the company's belief that it had the right to adjust wage rates.

IRON AND STEEL SCRAP

... Strength at Chicago boosts composite 5c. to \$16.13, following gain of 4c. last week.

APRIL 23—Price advances of 50c. a ton have been warranted in steel making grades at Youngstown and Cleveland and 25c. at Buffalo, based on recent transactions. At St. Louis a sale of 5000 tons of No. 2 has caused dealers to advance their buying prices 25c. a ton on some items. The Chicago market is stronger, and although there have been no new sales into consumption, based on what brokers are paying dealers to cover the last mill order, the average price of No. 1 has been advanced 12½c., following a similar move the week before. Prices of No. 1 at Pittsburgh and Philadelphia are unchanged, so the net advance in the composite price is only 5c. Foundry items are strong at Pittsburgh and cast grades are active at Philadelphia. The strength in other markets may indicate a further rise in the composite next week. This is the second consecutive rise, small though it is, and marks the first turn in the trend since last October.

The average of the composite price for the four weeks of April is \$16.08 as compared with \$16.56 for March and \$16.88 for February.

Complete dullness rules in export markets owing to lack of vessels at most ports.

Pittsburgh

Increased operations recently at steel foundries have resulted in considerable strength in the low phos. scrap market. Otherwise the market remains dull owing to the disinterest of what few Pittsburgh scrap consumers there are left for the time being in this area. No. 1 heavy melting is still nominally quoted at \$16 to \$16.50, a condition which is in marked contrast to other nearby areas where activity is on a broader base.

Chicago

The Chicago market is stronger this week, though \$15.25 still marks the last mill purchase. Brokers are paying \$15.75 to dealers for tonnages to cover these old orders, and as high as \$16 has been heard but is unconfirmed. Considerable old material seems to be moving into this district. Dealers apparently feel convinced that new steel business and consequently operations are scheduled for a substantial rise in the near future. No. 1 steel this week is quoted at \$15.25 to \$15.50, representing a moderate increase in sympathy with broker-dealer transactions. The Rock Island is offering over 6000 tons of assorted scrap, including 1400 tons of No. 1 steel.

Philadelphia

The market here remains essentially unchanged from the preceding two weeks and current quotations appear to be holding. No noteworthy sales of melting steel have been made lately, although at least one mill has indicated interest in an important tonnage. Cast items are moderately active. The second boat loaded this month has left Port Richmond and the next boat is not expected until around the middle of May. This boat will pick up 2000 tons of scrap, the balance of the cargo being new steel, for shipment to England. The May scrap list of Pennsylvania amounts to 27,050 tons, including 6500 tons of No. 1 steel.

Youngstown

Adjustments in line with actual going prices are made this week in open-hearth grades which are quoted up 50c. a ton. While open-hearth operations have improved some, it is too early to state that a trend has developed in scrap. At Warren preparations for putting the new electric furnace plant into production have been accompanied by scrap buying. The tonnage required by this plant can be construed as a transfer from the Pittsburgh district.

Cleveland

Heavy melting grades are adjusted upward 50c. a ton this week on the basis of two actual transactions, both moderate in size, which however, do not necessarily indicate a trend. No. 1 is now quoted \$16.50 a ton. No. 1 bushelling prices are strong, partly resulting from demand in the Pittsburgh district with heavy downstate electric furnace requirements. The first vessel shipment of scrap arrived here early this week.

Buffalo

Although the largest district consumer maintains an offer of \$15 for No. 1 steel and another large purchaser has suspended shipments, sales of the No. 1 grade have been made recently at higher than the quoted range, advancing this price 25c. to \$16 to \$16.50. Allied grades are unchanged. Additional sales of No. 1 machinery cast have increased the value of this commodity to \$18.50 to \$19.

Detroit

Scrap on old orders continues to move into the local mill and it is reported that most shipments are expected to be in by May 1. There is, however, no indication of further buying for consumption locally. Within the trade there is continued expectation that the Ford Motor Co., ordinarily not a purchaser of scrap, will be in the market for open-hearth material, although it has been stated by the motor manufacturer that sufficient scrap was being obtained from parts manufac-

turers who are trading scrap direct. Continued strength is shown by foundry scrap attributable largely to die pouring which is at a peak now.

St. Louis

An East Side mill bought 5000 tons of No. 2 heavy melting steel from four brokers, at prices which caused the latter to increase their price for this grade 25c. a ton, but other grades of melting steel were 25c. a ton lower. Railroad lists: Chicago, Rock Island & Pacific, 7000 tons; Chicago, Burlington & Quincy, 2900 tons.

Birmingham

Substantial purchases by a local mill which had retired from the market for a few weeks has nearly exhausted scrap accumulations in this area. Dealers had not been any too eager to speculate on the future during the past few weeks, and as a result, the influx of material, while steady, has not been sufficient to make any definite impression on the supply. The purchase was made at \$14.50 for No. 1 and \$13.50 for No. 2, leaving current quotations unchanged from last week.

New York

On Monday of this week, there was not a boat loading in the New York harbor and export activity had reached the lowest point in years. Exporters are little interested in material, even though boats are expected next week. Withdrawal of boats of Scandinavian registry from trade has further tended to restrict the supply of bottoms for scrap carrying, making the scheduling of vessel movements more uncertain than they have ever been. Buying prices are unchanged, the only change noted being the correction of typographical errors in last week's issue.

Boston

Business is exceptionally quiet due to a lack of domestic consumer interest and a lack of vessel space for exporters. A Swedish boat expected at Providence has not shown up. Another boat to load for Spain is scheduled to arrive at the Rhode Island port late this week, but there is nothing certain on this point. No vessel space is available at Boston. A Weirton consumer is in the market for bundled skeleton for which brokers offer \$8.80 a ton on cars, an advance of 40c. Brokers are paying \$14 to \$14.50 a ton delivered dock for No. 1 hydraulic bundled skeleton, which eliminates skeleton material for Pennsylvania delivery.

Toronto

Cast scrap has been under strong demand recently and dealers have marked up prices to stimulate offerings. Local dealers are offering \$20 a gross ton for machinery cast; \$19 for dealers' cast and \$14 for stove plate delivered Toronto yards, while corresponding prices are in effect in the Montreal market. Steel scrap while holding firm remains unchanged on dealers' lists, although some dealers still are paying above market for some materials. Steel mills and other consumers are taking heavy melting and other steel as offered, but are not pushing for deliveries.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.00 to \$16.50
Railroad heavy melting	17.00 to 17.50
No. 2 heavy melting	14.50 to 15.00
Railroad scrap rails	17.50 to 18.00
Rails 3 ft. and under	21.00 to 21.50
Comp. sheet steel	16.00 to 16.50
Hand bundled sheets	15.00 to 15.50
Heavy steel axle turn.	14.00 to 14.50
Machine shop turnings	10.00 to 10.50
Short. shov. turnings	11.50 to 12.00
Mixed bor. & turn.	8.75 to 9.25
Cast iron borings	8.75 to 9.25
Cast iron carwheels	19.00 to 19.50
Heavy breakable cast.	15.00 to 15.50
No. 1 cupola cast	17.50 to 18.00
RR. knuckles & coup.	21.00 to 21.50
Rail coil springs	21.50 to 22.00
Rail leaf springs	21.50 to 22.00
Rolled steel wheels	21.50 to 22.00
Low phos. billet crops	21.50 to 22.00
Low phos. punchings	21.00 to 21.50
Low phos. heavy plate	20.00 to 20.50
Railroad malleable	21.00 to 21.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.50 to \$17.00
No. 2 hvy. mltng. steel.	15.50 to 16.00
Hydraulic bund., new.	16.50 to 17.00
Hydraulic bund., old.	14.00 to 14.50
Steel rails for rolling	20.50 to 21.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast.	18.50 to 19.00
No. 1 cupola cast	20.00 to 20.50
Mixed yard (f'd'y) cast	16.50 to 17.00
Stove plate (steel wks.)	15.00 to 15.50
Railroad malleable	21.00 to 22.00
Machine shop turn.	9.50 to 10.00
No. 1 blast furnace	9.00 to 9.50
Cast borings	10.50 to 11.00
Heavy axle turnings	14.00 to 14.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rolled steel wheels	21.00 to 21.50
Steel axles	21.50 to 22.00
Shafting	22.00 to 22.50
Spec. iron & steel pipe	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:
Per Gross Ton

Hvy. mltng. steel	\$15.25 to \$15.50
Auto. hvy. mltng. steel alloy free	14.25 to 14.50
No. 2 auto steel	12.00 to 12.50
Shoveling steel	15.25 to 15.50
Factory bundles	14.75 to 15.00
Dealers' bundles	13.25 to 13.50
No. 1 busheling	14.25 to 14.50
No. 2 busheling, old	7.00 to 7.50
Rolled carwheels	17.50 to 18.00
Railroad tires, cut	18.00 to 18.50
Railroad leaf springs	17.25 to 17.75
Steel coup. & knuckles	17.50 to 18.00
Axle turnings	14.50 to 14.75
Coil springs	18.75 to 19.25
Axle turn. (elec.)	16.00 to 16.50
Low phos. punchings	18.00 to 18.50
Low phos. plates 12 in. and under	17.50 to 18.00
Cast iron borings	9.00 to 9.25
Short shov. turn.	9.25 to 9.75
Machine shop turn.	8.50 to 9.00
Rerolling rails	18.00 to 18.50
Steel rails under 3 ft.	17.75 to 18.25
Steel rails under 2 ft.	19.00 to 19.50
Angle bars steel	18.50 to 19.00
Cast iron carwheels	16.75 to 17.25
Railroad malleable	19.25 to 19.75
Agric. malleable	13.75 to 14.25

Per Net Ton

Iron car axles	21.00 to 21.50
Steel car axles	20.50 to 21.00
Locomotive tires	14.00 to 14.50
Pipes and flues	10.50 to 11.00
No. 1 machinery cast.	15.50 to 16.00
Clean auto. blocks	15.50 to 16.00
No. 1 railroad cast.	14.00 to 14.50
No. 1 agric. cast.	12.50 to 13.00
Stove plate	9.00 to 9.50
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.50 to \$17.00
No. 2 hvy. mltng. steel	15.50 to 16.00
Low phos. plate	19.00 to 19.50
No. 1 busheling	15.75 to 16.25
Hydraulic bundles	16.00 to 16.50
Machine shop turn.	10.00 to 10.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.00 to \$16.50
No. 2 hvy. mltng. steel.	15.00 to 15.50

Comp. sheet steel	15.50 to 16.00
Light bund. stampings	13.50 to 14.00
Drop forge flashings	15.00 to 15.50
Machine shop turn.	8.50 to 9.00
Short shov. turn.	9.50 to 10.00
No. 1 busheling	15.50 to 16.00
Steel axle turnings	14.50 to 15.00
Low phos. billet and bloom crops	20.50 to 21.00
Cast iron borings	9.50 to 10.00
Mixed bor. & turn.	9.50 to 10.00
No. 2 busheling	9.50 to 10.00
No. 1 cupola cast.	19.00 to 19.50
Railroad grate bars	13.50 to 14.00
Stove plate	13.50 to 14.00
Rails under 3 ft.	20.00 to 20.50
Rails for rolling	19.50 to 20.00
Railroad malleable	19.00 to 19.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$16.00 to \$16.50
No. 2 hvy. mltng. steel.	14.50 to 15.00
Scrap rails	18.50 to 19.00
New hvy. b'ndled sheets	14.50 to 15.00
Old hydraul. bundles	12.50 to 13.00
Drop forge flashings	14.50 to 15.00
No. 1 busheling	14.50 to 15.00
Machine shop turn.	10.50 to 11.00
Shov. turnings	11.50 to 12.00
Mixed bor. & turn.	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Knuckles & couplers	19.50 to 20.50
Coil & leaf springs	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
No. 1 machinery cast.	18.50 to 19.00
No. 1 cupola cast	17.50 to 18.00
Stove plate	14.50 to 15.00
Steel rails under 3 ft.	21.50 to 22.00
Cast iron carwheels	17.50 to 18.00
Railroad malleable	19.00 to 19.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$14.00 to \$14.50
No. 1 hvy. melting	13.50 to 14.00
No. 2 hvy. melting	12.25 to 12.75
No. 1 locomotive tires	14.75 to 15.25
Misc. stand. sec. rails	15.00 to 15.50
Railroad springs	16.25 to 16.75
Bundled sheets	9.00 to 9.50
No. 1 busheling	13.00 to 13.50
Cast bor. & turn.	5.00 to 5.50
Machine shop turn.	6.50 to 7.00
Heavy turnings	9.25 to 9.75
Rails for rolling	17.50 to 18.00
Steel car axles	18.50 to 19.00
No. 1 RR wrought	10.00 to 10.50
No. 2 RR wrought	12.50 to 13.00
Steel rails under 3 ft.	18.00 to 18.50
Steel angle bars	14.75 to 15.25
Cast iron carwheels	15.50 to 16.00
No. 1 machinery cast.	14.75 to 15.25
Railroad malleable	16.00 to 16.50
Breakable cast	14.00 to 14.50
Stove plate	10.50 to 11.00
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	\$12.25 to \$12.75
No. 2 hvy. mltng. steel.	10.25 to 10.75
Scrap rails for mltng.	16.75 to 17.25
Loose sheet clippings	7.75 to 8.25
Hydrau. b'ndled sheets	11.75 to 12.25
Cast iron borings	3.50 to 4.00
Machine shop turn.	4.75 to 5.00
No. 1 busheling	8.75 to 9.25
No. 2 busheling	2.75 to 3.00
Rails for rolling	18.25 to 18.75
No. 1 locomotive tires	13.75 to 14.25
Short rails	18.75 to 19.25
Cast iron carwheels	14.25 to 14.75
No. 1 machinery cast.	15.75 to 16.25
No. 1 railroad cast.	13.75 to 14.25
Burnt cast	7.50 to 8.00
Stove plate	7.50 to 8.00
Agricul. malleable	12.25 to 12.75
Railroad malleable	15.25 to 15.75
Mixed hvy. cast.	13.25 to 13.75

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$14.50
No. 2 hvy. melting steel	13.50
No. 1 busheling	14.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00
Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	18.00
No. 1 RR wrought	14.00
No. 1 cast	\$16.00
No. 2 cast	12.50
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 hvy. mltng. in-dustrial steel	\$12.50 to \$13.00
No. 2 hvy. mltng. steel	11.50 to 12.00
Borings and turnings	6.75 to 7.25
Long turnings	7.25 to 7.75
Short shov. turnings	8.25 to 8.75
No. 1 machinery cast.	15.50 to 16.00
Automotive cast	16.25 to 16.75
Hvy. breakable cast.	13.00 to 13.50
Stove plate	9.25 to 9.75
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel.	12.00 to 12.50
Sheet clippings	8.50 to 9.50
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.25

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$12.50 to \$13.00
No. 2 hvy. mltng. steel.	10.50 to 11.00
Hvy. breakable cast.	14.00 to 14.50
No. 1 machinery cast.	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Clean steel turnings*	5.00
Cast borings*	5.00 to 5.50
No. 1 blast furnace	5.00 to 5.50
Cast borings (chem.)	Nominal
Unprepared yard scrap	6.50 to 7.00
Light iron	4.50 to 5.00
Per gross ton delivered local foundries:	
No. 1 machin. cast.	\$17.00 to \$18.50
No. 2 cast	16.50 to 17.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	\$13.00 to \$13.25
Machine shop turn.	4.15
Mixed bor. & turn.	3.15
Bun. skeleton long	8.80
Shafting	17.00 to 17.25
Stove plate	9.75 to 10.00
Cast bor. chemical	8.00 to 8.50
Per gross ton delivered consumers' yards:	
Textile cast	\$15.50 to \$17.00
No. 1 machine cast.	15.50 to 17.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel.	\$13.25
No. 2 steel	12.25

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	\$12.00	\$12.00	\$11.00
No. 2 hvy. mltng. steel	11.00	11.00	10.00
Bundles	10.00	10.00	9.00

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	\$11.50	\$11.00
No. 1 hvy. mltng. steel	11.00	10.50
No. 2 hvy. mltng. steel	9.75	9.25
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	14.00	13.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	\$13.50*
No. 2 hvy. mltng. steel	\$11.50 to 12.00*
No. 2 cast	12.00 to 12.50*
Stove plate	10.00 to 10.50*
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	\$15.00*
No. 2 hvy. mltng. steel	14.00*
Rail (scrap)	15.00*
Stove plate	\$8.00 to 8.25*

* These prices also apply to these items printed in error in the April 18 issue.

Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel.	\$16.00
No. 2 hvy. mltng. steel.	14.75

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are effected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Re-rolling only). Prices delivered Detroit are \$2 higher F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Re-rolling \$31.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)
Per Lb.
Pittsburgh, Chicago or Cleveland 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.45c.
Galveston 2.25c.
9/32 in. to 47/64 in. \$3 a net ton higher. Quantity extras apply.

SOFT STEEL BARS

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered.. 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)
Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.05c.
On cars dock Tex. Gulf ports 2.40c.
On cars dock Pacific ports 2.65c.

IRON BARS

Chicago (common) 2.25c.
Pittsburgh (refined) 3.75c.
Pittsburgh (wrought iron) 4.40c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 1.70c. to 1.90c.*
Detroit, delivered 1.80c. to 2.00c.*
On cars dock Tex. Gulf ports 2.20c. to 2.25c.*
On cars dock Pacific ports 2.20c. to 2.25c.*

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham. 1.70c. to 1.90c.*

Detroit, delivered 1.80c. to 2.00c.*
On cars dock Tex. Gulf ports 2.20c. to 2.25c.*
On cars dock Pacific ports 2.20c. to 2.25c.*

* The so-called published price on new billet reinforcing bars is 2.15c. a lb. f.o.b. major basing points and on rail reinforcing bars is 2.00c. a lb. The price range shown above, however, represents the going prices at the present time.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c.
Philadelphia, del'd 2.15c.
New York, del'd 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham.. 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.
Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill
Standard rails, heavier than 60 lb., per gross ton \$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points
Light rails (from billets) per gross ton... \$40.00
Light rails (from rail steel) per gross ton.. 39.00

Base per Lb.
Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 1.90c.
Detroit, delivered 2.00c.
Philadelphia, delivered. 2.07c.
Granite City 2.00c.
On cars dock Pacific ports 2.40c.
Wrought iron sheets, Pittsburgh 4.75c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 2.85c.
Detroit, delivered 2.95c.
Granite City 2.35c.
Philadelphia, delivered. 3.17c.
On cars dock Pacific ports 3.45c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron sheets, Pittsburgh 7.00c.

Electrical Sheets

(F.o.b. Pittsburgh)

Base per Lb.
Field grade 3.20c.
Armature 3.55c.
Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.60c.
F.o.b. cars dock Pacific ports 4.30c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.15c.
Detroit, del'd 3.25c.
Granite City 3.25c.
On cars dock Pacific ports 3.75c.

TIN MILL PRODUCTS

Tin Plate

Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary (100 lb.) \$5.00
Standard cokes, Granite City (100 lb.) 5.10

Special Coated Manufacturing Ternes

Per Base Box
Granite City \$4.40
Pittsburgh or Gary ... 4.30

Roofing Terne Plate

(F.o.b. Pittsburgh per Package, 112 Sheets)

20x14 in. 20x28 in.
8-lb. coating I.C. \$6.00 \$12.00
15-lb. coating I.C. 7.00 14.00
20-lb. coating I.C. 7.50 15.00
25-lb. coating I.C. 8.00 16.00
30-lb. coating I.C. 8.63 17.25
40-lb. coating I.C. 9.75 19.50

Black Plate, 29 gage and lighter*

Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.
*Black plate base price applies to 29 gage within certain width and length limitations.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 1.90c.
Detroit, delivered 2.00c.
On cars dock Pacific ports 2.50c.

Cooperage Stock

Pittsburgh and Chicago 2.20c.

COLD ROLLED STRIP*

Base per Lb.
Pittsburgh, Youngstown or Cleveland 2.60c.
Chicago 2.70c.
Detroit, delivered 2.70c.
Worcester 2.80c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland 2.75c.
Detroit, del'd 2.85c.
Worcester 3.15c.

COLD ROLLED SPRING STEEL

Base per 100 Lb.
Carbon 0.26-0.50% 2.60c. 2.80c.
Carbon 0.51-0.75 4.30c. 4.50c.
Carbon 0.76-1.00 6.15c. 6.35c.
Carbon 1.01-1.25 8.35c. 8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade Per Lb.
Bright wire 2.60c.
Galvanized wire, base .. 2.60c.
Spring wire 3.20c.

To the Trade

Base per Keg
Standard wire nails \$2.55
Coated nails 2.55
Cut nails, carloads 3.85
Base per 100 Lb.
Annealed fence wire \$3.05
Woven wire fence, 15½ gage and heavier base col. 67
Fence posts (carloads), base col. 69
Single loop bale ties, base col. 56
Galvanized barbed wire on 80-rod spools (carloads) base col. 70
Twisted barbless wire, base col. 70
Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

In.	Black Galv.
1/8	56 36
1/4	59 43 1/2
3/8	63 1/2 54
1/2	66 1/2 58
3/4	68 1/2 60 1/2

In.	Black Galv.
1/8 & 1/4	+9 +30
1/4	24 6 1/2
3/8	30 13
1/2 & 3/4	34 19
1 1/2	38 21 1/2
2	37 1/2 21

In.	Black Galv.
2	61 52 1/2
2 1/2 & 3	64 55 1/2
3 1/2 to 6	66 57 1/2
7 & 8	65 55 1/2
9 & 10	64 1/2 55
11 & 12	63 1/2 54
2 1/2 to 3 1/2	30 15
3 1/2 to 4 1/2	31 1/2 17 1/2
4 1/2 to 5 1/2	33 1/2 21
5 1/2 to 6 1/2	32 1/2 20
6 1/2 to 7 1/2	28 1/2 15

In.	Black Galv.
1/8	54 1/2 41 1/2
1/4 to 3/8	56 1/2 45 1/2
1/2	61 1/2 53 1/2
3/4	65 1/2 57 1/2
1 to 3	67 60
1/4 & 3/8	+10 +43
1/2	25 9
3/4	31 15
1 to 2	38 22 1/2

In.	Black Galv.
2	59 51 1/2
2 1/2 & 3	63 55 1/2
3 1/2 to 6	66 1/2 59
7 & 8	65 1/2 56
9 & 10	64 1/2 55
11 & 12	63 1/2 54
2 1/2 to 3 1/2	33 1/2 18 1/2
3 1/2 to 4 1/2	39 1/2 25 1/2
4 1/2 to 5 1/2	37 1/2 24
5 1/2 to 6 1/2	38 1/2 24 1/2
6 1/2 to 7 1/2	32 20 1/2

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base cost.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes
Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes.
Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)	Lap	Seamless	Weld
	Cold	Hot	Hot
	Hot	Hot	Hot
1 in. o.d. 13 R.W.G.	\$9.01	\$7.82	\$8.22
1 1/4 in. o.d. 13 R.W.G.	10.07	9.26	9.66
1 1/2 in. o.d. 13 R.W.G.	11.70	10.23	10.72
1 3/4 in. o.d. 13 R.W.G.	13.42	11.64	12.06
2 in. o.d. 13 R.W.G.	15.03	13.04	13.38
2 1/4 in. o.d. 13 R.W.G.	16.76	14.54	14.79
2 1/2 in. o.d. 12 R.W.G.	18.45	16.01	16.16
2 3/4 in. o.d. 12 R.W.G.	20.21	17.54	17.58
3 in. o.d. 12 R.W.G.	21.42	18.59	18.35
3 1/2 in. o.d. 11 R.W.G.	28.37	24.02	23.15
4 in. o.d. 10 R.W.G.	35.20	30.54	28.66
4 1/2 in. o.d. 10 R.W.G.	43.04	37.35	35.22
5 in. o.d. 9 R.W.G.	54.01	46.87	44.25
6 in. o.d. 7 R.W.G.	82.93	71.96	68.14

Extruded for less carload quantities:
40,000 lb. or ft. over..... Base
50,000 lb. or ft. to 39,999 lb. or ft. 5%
20,000 lb. or ft. to 19,999 lb. or ft. 10%
10,000 lb. or ft. to 9,999 lb. or ft. 20%
5,000 lb. or ft. to 4,999 lb. or ft. 30%
2,000 lb. or ft. to 1,999 lb. or ft. 45%
Under 2,000 lb. or ft. 65%

CAST IRON WATER PIPE

Per Net Ton
*6-in. and larger, del'd Chicago.....\$54.80
6-in. and larger, del'd New York.....52.20
*6-in. and larger, Birmingham.....46.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles or Seattle 56.00

4-in. f.o.b. dock, San Francisco, Los Angeles or Seattle 59.00

Class "A" and gas pipe, \$3 extra
4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45. Birmingham, and \$53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List
Machine and carriage bolts:
1/2 in. and 6 in. and smaller.....68 1/2
Larger and longer up to 1 in. ....66
1 1/4 in. and larger ....64
Lag bolts .....66
Plow bolts, Nos. 1, 2, 3, and 7 .....68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:
1/2 in. and smaller .....67
9/16 in. to 1 in. inclusive .....64
1 1/4 in. to 1 1/2 in. incl. ....62
1 1/2 in. and larger .....60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin.	U.S.S.	S.A.E.
hexagon nuts	67	70
1/2 in. and smaller.....	64	65
9/16 to 1 in.	62	62
1 1/4 in. through 1 1/2 in.	60	60
1 1/2 in. and larger.....	60	60
In full container lots, 10 per cent additional discount.		
Stove bolts in packages, with nuts loose .....72 1/2		
Stove bolts in packages, with nuts attached, add 15% extra.		
Stove bolts in bulk .....83 1/2		

On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets
(1/2 in. and larger)
Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham\$3.40

Small Rivets
(7/16 in. and smaller)
Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham65 and 10

Cap and Set Screws
(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller .....50 and 10
Milled headless set screws, cut thread 1/4 in. and larger .....64
3/16 in. and smaller .....73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller .....70
Upset set screws, cup and oval points .....75
Milled studs .....52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs
F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, \$56.00 a gross ton.

Alloy Steel Bars
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base 2.70c. Delivered, Detroit 2.80c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
200 (1 1/4% Ni)	\$0.35
2100 (1 1/4% Ni)	0.75
2300 (3 1/4% Ni)	1.55
2500 (5% Ni)	2.25
31 Ni-Cr	0.70
3200 Ni-Cr	1.85
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
4340 Cr-Ni-Mo	1.65
4345 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.20 to 0.30 Mo. 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr)	0.35
5100 Chrome steel (0.80-1.10 Cr)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

PIG IRON AND FERROALLOYS

No. 2 Foundry
F.o.b. Everett, Mass. ....\$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md. 24.00
Delivered Brooklyn 26.50
Delivered Newark or Jersey City 25.53
Delivered Philadelphia.. 24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown 23.00
F.o.b. Buffalo 23.00
F.o.b. Detroit 23.00
Southern, del'd, Cincinnati 23.06
Northern, del'd, Cincinnati 23.44
F.o.b. Duluth 23.50
F.o.b. Provo, Utah 21.00
Delivered, San Francisco, Los Angeles or Seattle 26.50
F.o.b. Birmingham* 19.33

* Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable
Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic
F.o.b. Everett, Mass. ....\$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md. 23.50
F.o.b. Buffalo 22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown 22.50
Delivered Philadelphia.. 24.34
Delivered Canton, Ohio. 23.89
Delivered Mansfield, Ohio 24.44
F.o.b. Birmingham 18.00

Bessemer
F.o.b. Buffalo\$24.00
F.o.b. Everett, Mass. 25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa. 25.00

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel
No. 304 No. 302
Forging billets ..21.25c. 20.40c.
Bars 25c. 24c.
Plates 29c. 27c.
Structural shapes 25c. 24c.
Sheets 36c. 34c.
Hot-rolled strip..23.50c. 21.50c.
Cold-rolled strip. 30c. 28c.
Drawn wire 25c. 24c.

Straight Chrome
No. 410 No. 430 No. 442 No. 446
Bars 18.50c. 19c. 22.50c. 27.50c.
Plates 21.50c. 22c. 25.50c. 30.50c.
Sheets 26.50c. 29c. 32.50c. 36.50c.
Hot strip 17c. 17.50c. 24c. 35c.
Cold strip 22c. 22.50c. 32c. 52c.

TOOL STEEL

High speed .....67c.
High-carbon-chrome .....43c.
Oil-hardening .....24c.
Special .....22c.
Extra .....18c.
Regular .....14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

Delivered Newark or
Jersey City 26.53
Erie, Pa., and Duluth 24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown 23.50
F.o.b. Birmingham 24.00
Delivered Cincinnati 24.11
Delivered Canton, Ohio. 24.89
Delivered Mansfield, Ohio 25.44

Low Phosphorus
Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo\$28.50

Gray Forge
Valley or Pittsburgh furnace\$22.50

Charcoal
Lake Superior furnace..\$27.00
Delivered Chicago 30.34

Canadian Pig Iron
Per Gross Ton
Montreal
Foundry iron \$27.50 base
Malleable 28.00 base
Basic 27.50 base

Toronto
Foundry iron \$25.50 base
Malleable 26.00 base
Basic 25.50 base
On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

Ferromanganese
F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton
Domestic, 80% (carload) .....\$100.00

Spiegeleisen
Per Gross Ton Furnace
Domestic, 19 to 21% ..\$32.00
Domestic, 26 to 28% .. 39.50

Electric Ferrosilicon
Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)\$69.50*
50% (ton lots, packed). 82.00*
75% (carload lots, bulk).128.00*
75% (ton lots, packed).142.00*

Bessemer Ferrosilicon
F.o.b. Furnace, Jackson, Ohio

Per Gross Ton
10.00 to 10.50% .....\$32.50
For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, \$1 per ton additional.
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton
F.o.b. Jackson, Ohio, 5.00
to 5.50%\$27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon11.00c.
2% carbon17.50c.
1% carbon18.50c.
0.10% carbon20.50c.
0.06% carbon21.00c.
Spot prices are 1/4c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon\$98.00*
2.50% carbon103.00*
2% carbon108.00*
1% carbon118.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W. del. carload\$2.00
Ferrotungsten, 100 lb. and less2.25
Ferrovanadium, contract, per lb. contained V., del'd \$2.70 to \$2.90†
Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots \$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton\$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton\$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton\$58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville\$75.00

Ferromolybdenum, per lb. Mo f.o.b. furnace 95c.
Calcium molybdate, per lb. Mo f.o.b. furnace 80c.
Molybdenum oxide briquettes 48-52% Mo per lb. contained Mo f.o.b. Langeloth, Pa. 80c.

*Spot prices are \$5 per ton higher.

†Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores

Delivered Lower Lake Ports Per Gross Ton
Old range, bessemer, 51.50%\$4.75
Old range, non-bessemer, 51.50%4.60
Mesaba, bessemer, 51.50% 4.60
Mesaba, non - bessemer, 51.50%4.45
High phosphorus, 51.50% 4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty Per Unit
Algerian, low P, Cu free, dry, 55 to 58% Fe14c.
Caucasian, washed, 52% Mn50c.
African, Indian, 44 to 48% Mn46c.
African, Indian, 49 to 51% Mn49c.
Brazilian, 46 to 48% Mn. 47c.
Cuban, del'd, duty free, 51% Mn62c.
Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered\$23.00 to \$23.50
Tungsten, domestic scheelite del'd..... 23.00 to 23.50
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)\$19.00
Rhodesian, 45%22.00
Rhodesian, 48% 26.00 to 27.00

*All foreign ore prices are nominal. War conditions have prevented trading in Swedish and Turkish ores and all quotations have therefore been withdrawn.

FLUORSPAR

Per Net Ton
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail\$21.00
Domestic, f.o.b. Ohio River landing barges.. 21.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines\$20.00 to \$22.00

Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid \$25.00 to \$25.50

Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines\$31.00
ditto, in bags, f.o.b., same mines\$32.60

FUEL OIL

Per Gal.
No. 3, f.o.b. Bayonne, N. J.5.40c.
No. 6, f.o.b. Bayonne, N. J.3.57c.
No. 5 Bur. Stds., del'd Chicago3.25c.
No. 6 Bur. Stds., del'd Chicago2.75c.
No. 3 distillate, del'd Cleveland5.25c.
No. 4 industrial, del'd Cleveland5.00c.
No. 5 industrial, del'd Cleveland3.75c.
No. 6 industrial, del'd Cleveland3.25c.

COKE

Per Net Ton
Furnace, f.o.b. Connellsville, Prompt\$4.00 to \$4.25
Foundry, f.o.b. Connellsville, Prompt\$5.25 to \$5.50
Foundry, by-product Chicago ovens\$10.50
Foundry, by-product delivered New England\$12.50
Foundry, by-product delivered Newark or Jersey City, \$11.38 to \$11.90
Foundry, by-product Philadelphia\$11.13
Foundry, by-product delivered Cleveland\$11.05
Foundry, by-product delivered Cincinnati\$10.50
Foundry, Birmingham...\$7.50
Foundry, by-product delivered St. Louis industrial district\$10.75 to \$11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports\$14.75

REFRATORIES PRICES

Fire Clay Brick Per 1000 f.o.b. Works
Super-duty brick, at St. Louis\$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois47.50
First quality, New Jersey 52.50
Second quality, Pennsylvania, Maryland, Ken-

tucky, Missouri and Illinois42.75
Second quality, New Jersey49.00
No. 1 Ohio39.90
Ground fire clay, per ton 7.10

Silica Brick

Per 1000 f.o.b. Works
Pennsylvania\$47.50
Chicago District55.10
Birmingham47.50
Silica cement per net ton (Eastern)8.55

Chrome Brick

Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester\$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.50.00

Magnesite Brick

Net per Ton
Standard f.o.b. Baltimore and Chester\$72.00
Chemically bonded, f.o.b. Baltimore61.00

Grain Magnesite

Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)(—)*
Domestic, f.o.b. Baltimore and Chester in sacks.. 40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) .. 22.00

*None available.

British and Continental BRITISH

Per Gross Ton f.o.b. United Kingdom Ports
Ferromanganese, export£17 18s.
Tin plate, per base box32s. to 33s.
Steel bars, open hearth13£ 9s.
Beams, open hearth12£ 2s. 6d.
Channels, open hearth12£ 2s. 6d.
Angles, open hearth12£ 2s. 6d.
Black sheets, No. 24 gage 17£ max.*; 17£ min.**
Galvanized sheets, No. 24 gage 19£ 10s. max.*; 19£ 10s. min.**

*Empire markets only.
**Other than Empire markets.

CONTINENTAL

Per Gross Ton, Belgian France f.o.b. Continental Ports
Bars, merchant1500
Plates1750
Joists1475
Sheets, thin1900

Above prices are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc..

WAREHOUSE PRICES

Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	St. Louis	St. Paul	Milwaukee
Sheets, hot rolled	\$3.15	\$3.05	\$3.35	\$3.35	\$3.38	\$3.43	\$3.05	\$3.71	\$3.18	\$3.60	\$3.48
Sheets, cold rolled	4.75	4.10	4.05	4.35	4.40	4.50	4.30	4.78	4.12	4.95	4.43
Sheets, galv.	3.40	3.40	3.50	3.75	3.76	3.68	3.62	4.06	3.52	5.00	4.98
Strip, hot rolled	3.00	3.30	3.20	3.31	3.31	3.40	3.22	3.46	3.41	3.83	3.54
Strip, cold rolled	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.47	3.80	3.68
Plates	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.47	3.80	3.68
Structural shapes	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.62	3.75	3.63
Bars, hot rolled	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.02	4.34	3.88
Bars, cold finished	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	7.47	7.45	7.33
Bars, hot rolled SAE 2300	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	6.02	6.00	5.88
Bars, hot rolled SAE 3100	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	8.52	8.84	8.38
Bars, cold drawn SAE 2300	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	7.12	7.44	6.98
Bars, cold drawn SAE 3100											

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, less than 1500 lb., cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., galvanized sheets, any quantity, cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb. Extras for size, quality, etc., apply on above quotations.

FABRICATED STEEL

AWARDS

NORTH ATLANTIC STATES

- 1700 Tons, New York, New York Central viaduct, 11th Avenue and 35th Street, to Lehigh Structural Steel Co., New York.
- 1400 Tons, Belleville, N. J., manufacturing building and boiler house for Andrew Jergens Co., to Lehigh Structural Steel Co., Allentown, Pa.
- 880 Tons, Lancaster, Pa., building for Armstrong Cork Co., to A. B. Rote Co., Lancaster, Pa.
- 400 Tons, Burlington, N. J., Robins Conveying Belt Co., to Lehigh Structural Steel Co., New York.
- 385 Tons, Wilmington, Del., apartment building, to Max Corchin, Philadelphia.
- 335 Tons, Buffalo, addition for Hewitt Rubber Co., to R. S. McMannus Steel Construction Co., Buffalo.
- 245 Tons, Reading, Pa., S. S. Kresge store, to Lehigh Structural Steel Co., Allentown, Pa.
- 240 Tons, New York, alterations and addition to building at 23 Park Row, to Dreier Structural Steel Co., New York.
- 240 Tons, Springfield, Vt., Missing Link bridge, to American Bridge Co., Pittsburgh.
- 210 Tons, Newark, N. J., Hygienic Tube & Container building, to Albert Smith & Sons, Newark.
- 180 Tons, Niagara Falls, N. Y., storage building for National Carbon Co., to R. S. McMannus Steel Construction Co., Buffalo.
- 177 Tons, Syracuse, N. Y., warehouse addition for Continental Can Co., to American Bridge Co., Pittsburgh.
- 155 Tons, Hudson, N. Y., boiler plant building for New York State School, to Ingalls Iron Works Co., Birmingham.
- 150 Tons, Newark, N. J., Nurses' Home for Hospital and Home for Crippled Children, to Bethlehem Steel Co., Bethlehem, Pa.
- 120 Tons, Larchmont, N. Y., school building for St. Augustine's School, to Ingalls Iron Works Co., Birmingham.
- 105 Tons, New York, boiler supports for Waterside station, Consolidated-Edison Co., to American Bridge Co., Pittsburgh.
- 100 Tons, Binghamton and Utica, N. Y., two bowling buildings, to American Bridge Co., Pittsburgh.

THE SOUTH

- 260 Tons, Bosque County, Tex., bridge, to North Texas Iron & Steel Co., Fort Worth, Tex.
- 165 Tons, State of Texas, bridges, to Fort Worth Structural Steel Co., Fort Worth, Tex.
- 140 Tons, Virginia Beach, Va., fire control towers, to Acme Steel Engineering Co., Baltimore.

CENTRAL STATES

- 440 Tons, Peru, Ind., bridge No. 1369 for Nickel Plate Railroad, to Bethlehem Steel Co., Bethlehem, Pa.
- 380 Tons, Flint, Mich., train shed for Fisher Body Co., to Indiana Bridge Co., Muncie, Ind.
- 255 Tons, Sheboygan, Mich., State bridge, to R. C. Mahon Co., Detroit.
- 220 Tons, Cleveland, bridge at Jennings Road over Big Creek, to Burger Iron Works, Akron, Ohio.
- 210 Tons, Detroit, Rockham Engineering Foundation, to Whitehead & Kales Co., Detroit.
- 174 Tons, Bunker Hill, Ind., bridge No. 1347 for Nickel Plate Railroad, to American Bridge Co., Pittsburgh.
- 146 Tons, Cleveland, county bridge at Bulkley Boulevard and West 49th Street, to Fort Pitt Bridge Works Co., Massillon, Ohio.
- 130 Tons, Hamel, Minn., State bridge, to American Bridge Co., Pittsburgh.
- 125 Tons, Kalamazoo, Mich., W. T. Grant store, to International Steel Co., Evansville, Ind.
- 125 Tons, Cicero, Ill., turntable for Burlington railroad, to American Bridge Co., Pittsburgh.
- 120 Tons, Cleveland, building for Union Gospel, to Fort Pitt Bridge Works Co., Pittsburgh.
- 120 Tons, Beulah, Mich., bridge, to Wisconsin Bridge & Iron Co., Milwaukee.
- 115 Tons, Thompsonville, Mich., State bridge, to Wisconsin Bridge & Iron Co., Milwaukee.

- 110 Tons, Kansas City, Mo., Union Pacific Railroad span, to American Bridge Co., Pittsburgh.
- 110 Tons, Peoria, Ill., Hiram Walker malt distillery, to Mississippi Valley Structural Steel Co., Decatur, Ill.

WESTERN STATES

- 700 Tons, Mare Island, Cal., dry dock, to Bethlehem Steel Co., San Francisco.
- 500 Tons, Los Angeles, General Motors Corp. plant addition, to Consolidated Steel Corp., Los Angeles.
- 350 Tons, Vancouver, Wash., machine shop for Aluminum Co. of America, to Bethlehem Steel Co., San Francisco.
- 315 Tons, Oakland, Cal., hangar at municipal airport, to Golden Gate Iron Works, San Francisco.
- 240 Tons, Gardiner, Mont., Lamar River bridge, to Bethlehem Steel Co., San Francisco.
- 215 Tons, San Francisco, apartment house at Broadway and Franklin Street, to Golden Gate Iron Works, San Francisco.
- 165 Tons, Isleton, Cal., Georgiana Slough bridge, to Minneapolis-Moline Power Implement Co., Los Angeles, through Lord & Bishop, Sacramento, Cal., contractor.
- 130 Tons, San Francisco, Ghirardelli apartment house, to Western Iron Works, San Francisco.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 550 Tons, Ocean City, Md., Sinepuxent Bay State bascule bridge.
- 470 Tons, Westchester-Putnam Counties, N. Y., State grade crossing elimination.
- 375 Tons, New York, contract No. 10, section 2, Bowery Bay sewage works.
- 330 Tons, Brooklyn, Kings County Hospital building.
- 265 Tons, Baltimore, McCullough housing project.
- 220 Tons, Waterbury, Conn., tube rolling building for American Brass Co.
- 180 Tons, Baltimore, building for Rheem Mfg. Co.
- 150 Tons, Milford, Conn., Wilbur Cross Parkway State bridge.
- 150 Tons, Dunkirk, N. Y., building extension for Allegheny Ludlum Steel Corp.; Gilmore, Carmichael & Olson Co., Cleveland, general contractor (previously reported).
- 120 Tons, Corning, N. Y., building for Corning Fibre Box Corp.
- 120 Tons, Carlstadt, N. J., warehouse building.

THE SOUTH

- 300 Tons, Charlestown, W. Va., department store addition for The Diamond, Inc.
- 165 Tons, State of Texas, bridges, bids by State Highway Department.

CENTRAL STATES

- 310 Tons, State of Wisconsin, three State highway bridges; bids April 30.
- 225 Tons, State of Nebraska, State highway bridge; bids April 25.
- 180 Tons, Harritown, Ill., State bridge SA-route 27, section 404-F.
- 150 Tons, Chicago, subway section S1A; bids May 9.
- 150 Tons, Blissfield, Mich., Raisin River State bridge.
- 130 Tons, Detroit, store building for Henry Estate.
- 124 Tons, Middlefield, Ohio, Lawrence County State project No. 43; bids May 3.
- 120 Tons, Broomfield Hills, Mich., building for Cranbrook School.
- 100 Tons, State of Indiana, three State highway bridges; bids April 30.

WESTERN STATES

- 700 Tons, Berkeley, Cal., administration building for University of California; bids later.
- 625 Tons, Caddoa, Colo., railroad relocation bridges at Caddoa Reservoir project; bids April 30 (previously reported).
- 520 Tons, State of Colorado, two State highway bridges; bids April 30.
- 436 Tons, Denver, Sand Creek bridge, including piling; bids April 30.
- 125 Tons, Half Moon Bay, Cal., bearing piles for State bridges; bids May 8.

FABRICATED PLATES

AWARDS

- 1650 Tons, Wood River, Ill., six tank barges for Standard Oil Co. of Indiana, to Marietta Mfg. Co., Point Pleasant, W. Va.

- 400 Tons, Muskegon Heights, Mich., city water system, to Chicago Bridge & Iron Co., Chicago.
- 135 Tons, Moorhead, Minn., water tank, to Chicago Bridge & Iron Co., Chicago.
- 115 Tons, Tulsa, Okla., cylinders and heads for Vulcan Steel Tank Co., to Carnegie-Illinois Steel Corp., Pittsburgh.
- 110 Tons, St. Louis, cylinders and heads for Combustion Engineering Co., to Wyatt Metal & Boiler Co., Dallas, Tex.

PENDING PROJECTS

- 1900 Tons, Seattle, tanks for Richfield Oil Co.
- 1300 Tons, Bremerton, Wash., caisson gates for dry dock No. 5 at Navy Yard.

SHEET PILING

AWARDS

- 2000 Tons, Mare Island, Cal., dry dock, to Columbia Steel Co., San Francisco, through Ben C. Gerwick, Inc., and Clyde Wood, San Francisco contractors.

PENDING PROJECTS

- 1750 Tons, Chicago, subway section S1A; bids May 9.

War Complicates Exports of Steel

A SERIES of problems for American exporters of steel has followed in the wake of the spread of the war to the Scandinavian countries. A considerable number of steel shipments on the way to Scandinavian countries when Germany invaded Denmark and Norway were ordered back to the United States. They are now here and are piling up storage charges until such time as the material can be reshipped to its original destination or otherwise disposed of.

While in most instances the steel was fully paid for and therefore is the property of the purchaser, it has been necessary for the steel companies to assume protection of it and pay storage charges until disposition of the material can be determined. It is possible that some of the steel may become distress material and offered for sale to other foreign purchasers, which might have a temporarily disturbing effect on American steel export prices.

If Italy should enter the war on the side of Germany, the flow of steel and other American products to Mediterranean countries might be cut off entirely or seriously interrupted. Thus most of Europe other than Great Britain and France would be shut off as an export market for American steel. Italy itself has recently been a good steel customer of the United States.

South American countries, which have been exceptionally good customers, are said to be fairly well stocked with steel, and the outlook there for the immediate future is uncertain. Japan's purchases in the United States are restricted by credit considerations.

REINFORCING STEEL

... Awards of 4510 tons; 6125 tons in new projects

AWARDS

ATLANTIC STATES

- 230 Tons, Belleville, N. J., Andrew Jergens Co. plant, to Bethlehem Steel Co., Bethlehem, Pa., through James Stewart & Co., contractors.
- 150 Tons, Buffalo, addition to Sattler's, Inc., department store, to Truscon Steel Co., Buffalo.
- 121 Tons, Allegheny and Washington Counties, Pa., State highway routes, to Jones & Laughlin Steel Corp., Pittsburgh, through Electric Welding Co.
- 100 Tons, Boston Navy Yard building No. 16, to Bethlehem Steel Co., Bethlehem, Pa., through Hughes-Foulkrod Co., contractor.
- 100 Tons, Bedford, Pa., Pennsylvania Turnpike Commission, section 13P3, to Bethlehem Steel Co., Bethlehem, Pa.
- 100 Tons, Dauphin, Pa., State highway project, route 1, to Bethlehem Steel Co., Bethlehem, Pa., through C. W. Good, contractor.
- 100 Tons, Westchester County, N. Y., Hutchinson River Parkway, to Seaboard Steel Products Corp., New York.

SOUTH AND CENTRAL

- 1100 Tons, Toledo, Ohio, high and low pressure pumping stations (Lake Erie water project) to Truscon Steel Co., Youngstown, through A. Bentley & Sons, contractors.
- 300 Tons, Lexington, Ky., housing project, to Calumet Steel Co.
- 300 Tons, Toledo, Ohio, chemical building, division AA (Lake Erie Water project) to Bethlehem Steel Co., Bethlehem, Pa., through J. A. Utley Co., contractor.
- 140 Tons, Highland Park, Mich., factory addition, Chrysler Corp., to Truscon Steel Co., Youngstown, through O. W. Burke Co., contractor.
- 110 Tons, Louisville, Ky., factory, Kentucky Macaroni Co., to Pollak Steel Co., Cincinnati, through Dalhem Construction Co., contractor.
- 100 Tons, Springfield, Ohio, joists for F. W. Woolworth store, to United Fabricators of America, Wooster, Ohio, through Paugh & Brown, Cleveland, general contractors.
- 100 Tons, Columbus, Ohio, Gwinn Milling Co. silos, to Pollak Steel Co., Cincinnati, through Arthur S. Clemens, contractor.
- 100 Tons, Whiting, Ind., Standard Oil Co., to Inland Steel Co., Chicago.

WESTERN STATES

- 700 Tons, Mare Island, Cal., dry dock, to Bethlehem Steel Co., San Francisco, through Ben C. Gerwick, Inc., and Clyde Wood, San Francisco, contractors.
- 250 Tons, Odair, Wash., Grand Coulee Dam (Invitation B-38227-A), to Bethlehem Steel Co., San Francisco.
- 154 Tons, Ignacio, Colo., Pine River project (Invitation 32194-A), to Republic Steel Corp., Cleveland.
- 100 Tons, Deer Creek, Utah, Provo River project (Invitation 27672), to Republic Steel Corp., Cleveland.

HAWAII

- 150 Tons, Honolulu, Kailua water system, to Bethlehem Steel Co., San Francisco, through Grace Brothers, Honolulu.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 1200 Tons, Ocean City, Md., Sinepuxent Bay bridge.
- 500 Tons, State of Connecticut, mesh for State roads.
- 240 Tons, Westchester County, N. Y., Eastchester bridge; bids April 26 by Triborough Bridge Authority.
- 114 Tons, Wilmington, Conn., bridge over Central Vermont Railroad.

CENTRAL STATES

- 1350 Tons, Chicago, subway section S1A; bids May 9.
- 400 Tons, Chicago, substructure State Street bridge; bids in.
- 400 Tons, Detroit, Parkside Housing, unit B.
- 200 Tons, Macon County, Ill., Lincoln Memorial bridge.
- 200 Tons, Chicago, Santa Fe bridge, Western Avenue.

- 180 Tons, Milwaukee, Sears-Roebuck & Co. store; bids April 25.
- 134 Tons, Chicago, garage, 125 South Dearborn Street.
- 125 Tons, Rolla, Mo., chemistry building for Missouri School of Mines; bids taken April 23.

WESTERN STATES

- 900 Tons, Los Angeles, Brea Dam; bids June 5.
- 180 Tons, Half Moon Bay, Cal., State bridges; bids May 8.

CAST IRON PIPE

Fairhaven, Mass., will be in the market soon for pipe for a water system extension. F. E. Brown is chairman of Board of selectmen. Frank A. Barbour, Boston, is engineer.

Waltham, Mass., will close bids this week for cast iron centrifugal spun water pipe. H. G. Saumsiegle is city purchasing agent.

Hamilton, Mass., has arranged for WPA funds for additional water mains and will call for bids on pipe. Whitman & Howard, 89 Broad Street, Boston, are engineers.

East Bridgewater, Mass., has applied for \$13,000 WPA funds and will contribute \$3,400 for water mains. Plans are private.

Kingston, Mass., will be in the market soon for about 3600 ft. of 6 and 8-in. pipe. WPA will furnish \$16,000 and the town several thousand dollars for the project.

Hartford, Conn., Metropolitan Water District Commission has taken under advisement bids on about 517 tons of 6, 8 and 12-in. pipe.

Chicago will take bids through contractors May 9 on 216 tons of cast iron pipe for subway section S1A.

Wheaton, Mo., plans pipe lines for water system, also elevated steel tank and tower, and other waterworks installation. Cost about \$40,000, of which \$12,000 will be represented by bond issue, recently voted, and remainder secured through Federal aid.

McGuffey, Ohio, plans pipe lines for water system and other waterworks installation. Fund of \$210,000 is being secured through Federal aid for this and sewage disposal plant.

Hilbert, Wis., will take bids early in May for pipe lines for water system and other waterworks installation. Cost about \$55,000. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Mesquite, Nev., plans pipe lines for water system; also new 20,000-gal. elevated steel tank and tower, and other waterworks installation. Special election is being arranged to vote bonds for work.

Edmonds, Wash., will take bids at once for about 360 ft. of 15-in. cast iron sewer pipe for new outfall sewer system. George M. Leyda is city clerk.

Garden City, Kan., plans pipe lines for water system and other waterworks installation. Fund of about \$40,000 is being arranged for this and sewage system.

Coats, N. C., has called special election on May 14 to approve bonds for \$38,000 as part of fund of \$90,000, remainder to be secured through Federal aid, for pipe lines for water system and other waterworks installation. Part of appropriation will be used for sewage system.

State Prison Department, Sacramento, Cal., will take bids soon, through office of State architect, for pipe lines for water system at Chino State prison. Cost about \$94,500 with pipe lines for sewage system.

Wheatridge Water District, Wheatridge, Colo., plans special election early in May to approve bonds for \$74,000 for main pipe line and distribution lines for water system in district. Strong & Linn, Arvada, Colo., are consulting engineers.

Walnut Park, Cal., Mutual Water Co. has awarded 100 tons of 6 and 8-in. pipe to American Cast Iron Pipe Co., Los Angeles, through Fred W. Weber, Downey, Cal., contractor.

Los Angeles Department of Water and power has awarded 30,000 ft. of 8-in. pipe

to National Cast Iron Pipe Co., Los Angeles, and 10,000 ft. to American Cast Iron Pipe Co., Los Angeles, under Specification 3387.

Los Angeles Department of Water and Power will ask bids April 29 on 50,000 ft. of 6-in. pipe and 20,000 ft. of 8-in., Specification 3406.

... PIPE LINES ...

Shell Union Oil Corp., 50 West Fiftieth Street, New York, plans new welded steel pipe line from Fall River to Worcester, Mass., close to 60 miles, for gasoline transmission. Another similar line is being considered from first noted place to Boston, Chelsea and vicinity, approximately a like distance.

Magnolia Petroleum Co., Magnolia Building, Dallas, Tex., plans welded steel pipe line and pressure pipe line gathering system in West Ranch field, Jackson County, Tex., for natural gas supply for new natural gas repressuring plant in that district. Work will begin soon.

Nacogdoches, Tex., has engaged J. E. Ward, Harvey-Snyder Building, Wichita Falls, Tex., engineer, to make surveys and plans for pressure pipe lines for municipal natural gas distribution system, including main welded steel pipe line for connection with supply source. Installation will include control station, meter house and other operating facilities. Cost about \$150,000.

Elk City, Okla., plans pipe line extensions and replacements in municipal gas distribution system. Cost about \$194,000. Special election has been called to approve bond issue in that amount.

Shamrock Oil & Gas Co., Amarillo, Tex., and Lone Star Gas Co., 1915 Wood Street, Dallas, Tex., plan welded steel pipe line from Trinity gas field district to new recycling plant near Opelika, Tex., for natural gas transmission; also pipe line gathering system in gas district noted.

Cities Service Oil Co., Bartlesville, Okla., has let contract to A. O. Smith Corp., Milwaukee, for about 61 miles of 12 $\frac{3}{4}$ -in. steel pipe for new oil transmission line in Oklahoma, connecting with present system at price reported over \$250,000.

Niagara Brine Corp., Niagara Falls, N. Y., has been chartered with nominal capital of \$200,000 to build a pipe line for brine transmission from point near Linden, Genesee County, N. Y., to Niagara Falls, close to 60 miles, projected several months ago and on which work is being placed under way. Output will be distributed at terminus to local chemical plants for production of caustic soda, chlorine and other alkali products. Pipe line will lead from artificial lake of continuous salt brine at Linden, secured from salt deposits by hydraulic pumping units, and will operate under pressure. Booster stations will be installed along route. Entire project will cost about \$1,500,000. Ford Bacon & Davis, Inc., 39 Broadway, New York, is consulting engineer in charge.

Valley Pipe Line Co., Alamo National Bank Building, San Antonio, Tex., has approved plans for new 5 $\frac{1}{2}$ -in. welded steel pipe line from oil field at Rincon, eastern part of Starr County, Tex., to tank farm near Brownsville, Tex., about eight miles, for crude oil transmission. Cost close to \$65,000.

Copperweld Co. Pours Its First Heat of Alloy Steel

WARREN, OHIO — Copperweld Steel Co. here poured its first heat of alloy steel last week from one of the company's 25-ton electric furnaces at the new steel plant. Full time production is expected some time next month. All grades of alloy billet and bars will be produced at the new plant.

THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

... Foreign orders have eased, but orders for machine tools from aircraft builders with new Anglo-French contracts are beginning to come through in large volume ... Allied shell business placed in the East ... General buying holding up well in many districts, though little improvement is seen in deliveries.

Chicago Dealers Report Orders at Good Rate

CHICAGO—Orders for new machine tools are being received at a good rate and volume is little changed from a week ago. Inquiries are also holding up well though the Illinois tax situation has temporarily deterred the closing of some of these machines. As each day passes the tax question becomes better clarified, and sellers believe that a complete adjustment will be made shortly. The Milwaukee Railroad still has a few machines open on its now old list, but it is expected that these will be purchased this week. Some of the other railroads in this district may be in the market for machine tools shortly, but there is little else to anticipate other than orders for one or two machines. Considerable business is expected from the Rock Island Arsenal during the year but its 1940 budget has still not been approved in Washington.

Aircraft Industry Orders Bolster Eastern Market

NEW YORK—Day following the announcement in Washington, April 18, of the placement by the Anglo-French Purchasing Mission of large quantities of the latest type Curtiss pursuit ships and Douglas bombers, the aircraft engine builders in the East began releasing orders for machine tools. Up until that Friday, the week had been a dull one for most dealers. The general understanding, however, is that these equipment programs will not be as large as was expected two months ago when the initial inquiries were issued. On the other hand, most of the paper work in connection with the orders had been completed and space on manufacturing schedules had been reserved. In some instances, tentative orders had been entered subject to later cancellation. War has been felt in another way in this territory in the release of an Allied shell contract to a northern New Jersey manufacturer. Several others in the same vicinity are figuring on similar work, which is expected to be placed here in greater volume, now that the war has assumed a more active phase.

Despite farming out of some parts work on the part of machine tool builders and the continued expansion of plant facilities, little improvement is noted in the delivery situation. Fall deliveries represent the average condition today, with

some specialized lines quoted as much as a year ahead.

Decline in Foreign Demand; Domestic Volume Maintained

CINCINNATI—Machine tool demand during the past week in this area showed a fractional downward fluctuation from the level of the preceding period. Domestic demand has shown relatively no change and, if anything, there is a fractional increase in the domestic demand, but a decline in foreign orders has more than offset any change reported in home consumption. Lathes suffered the most from the current retarding of new business, but this demand is still far from being disappointing. Manufacturers generally report that inquiry continues to flow into their offices at a good rate and that the current potential demand continues to be substantial. While the current foreign demand is, of course, largely traceable to war uses, the domestic demand is from general sources. One or two items on domestic demand, however, might be traceable to war needs, but this is in the minority.

Current operations of factories are still maintained at full capacity, on the basis of the current labor market. Some margin in the night forces if more skilled men were available is still reported. Deliveries have continued to be extended and manufacturers report no change in the situation.

Large Aircraft Business Had Been Anticipated

CLEVELAND—Accompanying the reported distribution of large new airplane purchases by the Allies, machine tool orders involving hundreds of machines will be released, but represent confirmation of business which the machine tool industry has been expecting for some time. Producers earmarked these requirements pending the actual buying of planes.

Machine tool dealers here continue to ride the crest of the business wave with conditions so far this month maintained at the level of late March. As stated previously, principal problems are those involving deliveries and tooling. Several projects which came out weeks ago are still hanging fire while customers seek better deliveries than the dates offered so far.

From Jan. 1 up to April 15 one press

manufacturer reports booking as much domestic business as in the entire last half of 1939. Prominent factors in the gain are the automotive industry, electrical manufacturing and shell work. The latter type of business is approaching a new peak with a number of large awards imminent.

Extreme Spottiness Marks Automotive Buying

DETROIT—Extreme spottiness marks the spring sales results reported by machine tool makers. The condition has increased, compared with the winter months. Earlier, the uncertain character of the market was attributable to inability to make satisfactory deliveries; now that this situation has been alleviated in some degree, the automotive buying season for 1941 tooling is on the wane. Improvement in delivery terms has been effected largely by more efficiency and speed in shops, not by lessened demand, it is stated. A currently live project is at the City Auto Stamping Co. at Toledo, which is erecting a new \$500,000 plant to house its die division. Checker Cab Mfg. Co., Kalamazoo, has an order for 1200 taxis costing \$1,750,000 and is adding much tooling for the job. The manufacturer is understood to be buying welding equipment and machine tools. A new annealing furnace and allied equipment are to be installed shortly by McLouth Steel Corp., Detroit, which is adding 103 x 131 ft. of space to its plant.

On the Assembly Line

(CONCLUDED FROM PAGE 58)

last week for the 13th annual convention of the Michigan Industrial Education Society. Included in discussion panels were W. J. Cameron, Ford Motor Co.; C. E. Wilson, vice-president in charge of manufacturing, General Motors Corp.; M. A. Clark, U. S. Rubber Co.; Harry Roesch, Briggs Mfg. Co., and R. G. Waldron, Hudson Motor Car Co.

Along with Superfinished valve stems, Chrysler is now using burnished valve stem guides, impregnated with graphite lubricant. Special machines have been developed to burnish the guides, in the cylinder block, for size and finish, and at the same time impregnate the walls of the guides with colloidal graphite suspended in oil. The operation is performed by pressing steel balls through the guides. As the balls are pressed through, the balls and guides are given a shot of the lubricant and the fine graphite apparently is imbedded in the walls of the guides. The machines are hydraulically operated, with the beds at conveyor height so the cylinder blocks slide onto them. Plungers force the balls through, and hoppers carry the balls back to the start of the cycle.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

National Biscuit Co., 449 West Fourteenth Street, New York, will take bids at once on general contract for one and two-story baking plant, 214 x 435 ft., on 18-acre tract at Denver. Cost close to \$1,000,000 with traveling ovens, mixing machinery, conveyors and other equipment. Louis Wirsching is company architect.

Joseph E. Seagram & Sons, Inc., 405 Lexington Avenue, New York, has let general contract to J. A. Utley, 720 East Ten-Mile Road, Royal Oak, Detroit, for five-story addition, 70 x 100 ft., to branch plant at Louisville, and improvements in present multi-story building. A mechanical-bottling department will be installed. Cost close to \$250,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects and engineers.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until May 13 for 300,000 ft. of stranded waterproof wire and 200 metal reels (Circular 396).

Wallerstein Co., Inc., 180 Madison Avenue, New York, chemical products, has let general contract to Wigton-Abbott Corp., 60 East Forty-second Street, for one and three-story addition, 65 x 125 ft., to plant at Mariners Harbor, Staten Island. Cost over \$85,000 with equipment.

Celanese Corp. of America, Inc., 180 Madison Avenue, New York, has arranged appropriation of about \$7,000,000 for expansion in mills at Amcelle, Md., and Perisburg, Va.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 30 for four arc welding machines (Schedule 1413); until May 3, one motor-driven screw machine (Schedule 1421) for Brooklyn Navy Yard; valves (Schedule 1420) for Brooklyn and Philadelphia yards; until April 30, electric cable (Schedule 1393) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards; conveyor chains (Schedule 1414) for Philadelphia yard; until May 7, marker buoy cable (Schedule 1389) for New York and San Francisco.

Southern Alkali Corp., 30 Rockefeller Plaza, New York, plans expansion at Corpus Christi, Tex., plant, including new production units and equipment. Cost close to \$1,000,000 with machinery.

American Can Co., 230 Park Avenue, New York, has authorized fund of about \$17,500,000 for plant expansion and equipment purchases. Among immediate projects is extensions in branch plant at Jersey City, N. J.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until April 30 for breech ring steel forgings (Circular 588); until May 21, 39 to 126 howitzers, 75-mm. (Circular 573).

Purchasing and Contracting Officer, Office of District Quartermaster, CCC, Schenectady, N. Y., asks bids until April 30 for low pressure valves, pressure relief valves, check valves, etc. (Circular 5211-60).

Hygienic Tube & Container Corp., 34 Avenue L, Newark, N. J., plastic products, including tubing, vials, etc., has let general contract to W. J. Barney Corp., 101 Park Avenue, New York, for two and three-story and basement addition, about 75,000 sq. ft. of floor space, with one-story boiler house, 30 x 50 ft. Cost about \$160,000 with equipment. David Siegel, 24 Commerce Street, is architect.

Hoffman Beverage Co., 402 Grove Street, Newark, N. J., has let general contract to John W. Ferguson Co., Inc., 152 Market Street, Paterson, N. J., for addition to mechanical-bottling plant, and improvements in present

multi-story building. Cost over \$100,000 with equipment. Epple & Kahrs, 15 Washington Street, are architects.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until April 29 for reworking 10,500 lb. of aluminum turnings (Circular 1396); until May 6, two complete smokeless powder cutters (Circular 1387), one conveying and conveyor housing system (Circular 1394).

Barnard Aviation Equipment Co., Inc., 6 Dawson Street, Newark, aircraft parts and accessories, has acquired former mill of West Knitting Mills, Ashley, Pa., comprising two one-story units, and will remodel and remove present works to new location, increasing capacity.

Armstrong Cork Co., Lancaster, Pa., insulating products, etc., has let general contract to Herman Wohlsens' Sons Co., Lancaster, for one and two-story addition, 65 x 550 ft. Cost over \$150,000 with equipment.

Public Works Officer, Building No. 1, Navy Yard, Philadelphia, asks bids until May 1 for five underground fuel storage tanks (Specifications 9715).

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until April 29 for one hand beading machine for attaching aluminum ferrules to aluminum braided shielding conduit (S. & A. Req. B-6000-4993); until April 30, 12 5-ton hydraulic jacks (Aero Req. 1036).

◀ BUFFALO DISTRICT ▶

Camillus Cutlery Co., Camillus, N. Y., knives, shears, etc., has asked bids on general contract for two-story and basement addition, 60 x 120 ft. Cost close to \$50,000 with equipment. George H. Ketchum, Clinton Square Building, Syracuse, N. Y., is architect and engineer.

National Gypsum Co., 190 Delaware Avenue, Buffalo, building materials, has filed plans for three one-story additions, totaling 125 x 675 ft., at branch plant on Cabot Street, New York. Cost over \$100,000 with equipment. J. V. Anderson is company architect.

Roth Brothers Metal Co., Inc., 815 South State Street, Syracuse, N. Y., plans one-story addition, 50 x 240 ft., for storage and distribution. Cost close to \$45,000 with equipment. Wolfe Markam, Everson Building, is architect.

◀ WASHINGTON DIST. ▶

Quartermaster Depot, War Department, Washington, asks bids until May 8 for steel clothes lockers (Circular 950-219).

Board of District Commissioners, District Building, Washington, asks bids until May 1 for paper-insulated electric cable for electrical department.

Southern Biscuit Co., Terminal Place, Richmond, Va., has let general contract to Wise Contracting Co., Inc., 122 North Eighth Street, for two-story addition, 76 x 330 ft. Installation will include traveling ovens, conveyors, mixing machinery and other equipment. Cost close to \$350,000 complete. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 29 for three rotary drilling rigs and equipment, with one set of spare parts (Schedule 4012), 50 chilled cast iron wheels for towing locomotives, and 500 copper twin terminal bonds (Schedule 4016); until April 30, one 18-in. x 14-ft. tool room lathe, and one 9-in. x 5-ft. toolroom lathe, screw-cutting, both with accessories, motor and starting equipment (Schedule 4018); until May 6, wood circular saws, six coal-burning blacksmith portable forges, four

blacksmith's or post drills, drill chucks, etc. (Schedule 4019).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 30 for one self-propelled, gasoline tractor boom crane (Schedule 1307), motor-driven engine lathe (Schedule 1287); until May 2, boiler gaskets (Schedule 1281); until May 3, portable dehumidifier units (Schedule 1359) for Eastern and Western yards; until April 30, air-operated, wagon-type, light-weight drilling machine and accessories (Schedule 1403), air compressor, with electric motor, starting control, air tank and fittings (Schedule 1380) for Quantico, Va.; three motor-driven buffing and polishing machines (Schedule 1404) for Alexandria, Va.; parts for motor-boat gasoline engines (Schedule 1394) for Sewall's Point, Va., yard.

◀ NEW ENGLAND ▶

Hygrade Sylvania Corp., Lafayette Street and Loring Avenue, Salem, Mass., electric lamps, radio tubes, etc., plans two-story addition, erection to begin in June. Cost close to \$200,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until April 29 for 200 high-speed steel shank cutters and 250 steel end mills (Circular 354); until April 30, belt conveyor (Circular 357).

Fellows Gear Shaper Co., Springfield, Vt., has let general contract to Harty Blaney Construction Co., 25 Huntington Avenue, Boston, for one-story addition, 20 x 250 ft., to assembling department. Cost over \$70,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 14 for one cut-off machine (Schedule 1350), 11 drilling machines (Schedule 1351), all motor-driven, for Newport, R. I., Naval Station.

Vermont Foundries, Inc., Clinton Street, Springfield, Vt., has started work on an addition to main foundry, 100 x 102 ft., to cost \$60,000 without equipment. Harty-Blaney Construction Co., 25 Huntington Avenue, Boston, is contractor.

◀ SOUTH ATLANTIC ▶

Lake Erie Steel & Blanking Co., 221 East 131st Street, Cleveland, has leased one-story building at 602-04 Albany Avenue, Waycross, Ga., to be occupied by Vulcan Steel Products Corp., an affiliated interest, for new factory branch, storage and distributing plant, with assembly shop facilities.

United States Engineer Office, Wilmington, N. C., asks bids until May 2 for 40 cast steel ball and socket joints, with rubber gaskets, and for 80 cast steel flanges (Circular 119).

Shelby Coca-Cola Bottling Co., Shelby, N. C., will take bids on general contract in May for two-story mechanical-bottling, storage and distributing plant, with one-story garage for company motor trucks. Cost close to \$45,000 with equipment. Jesse M. Shelton, Bona Allen Building, Atlanta, Ga., is architect.

◀ SOUTH CENTRAL ▶

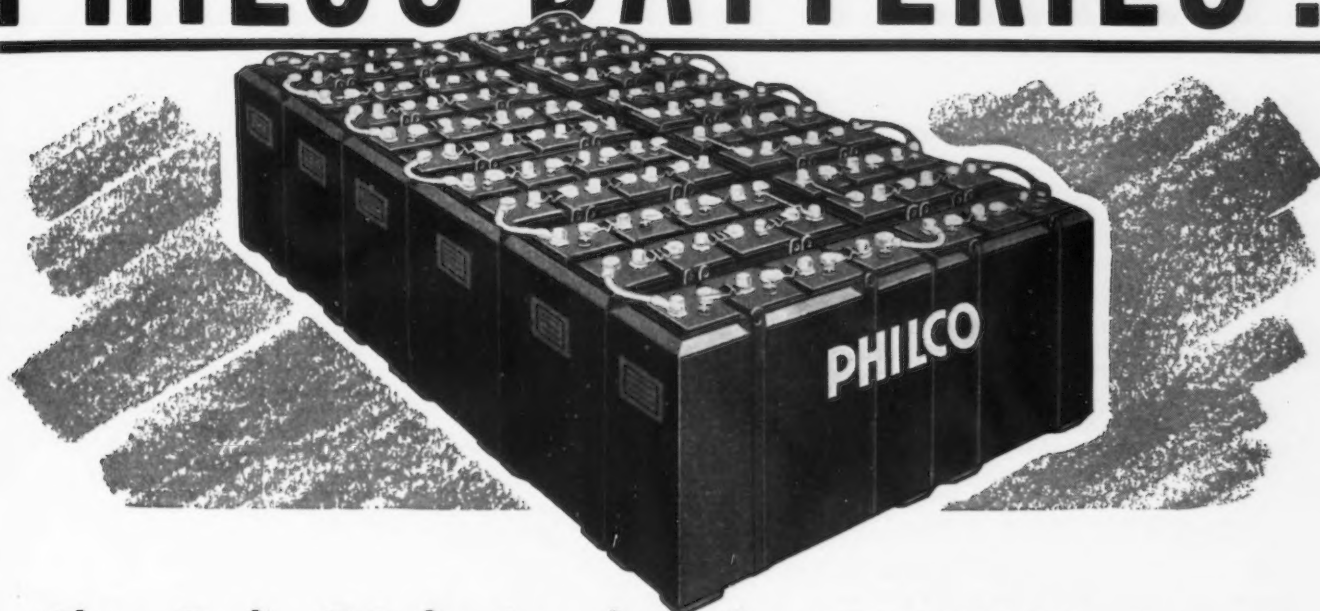
W. C. Nabors Co., Oak Street, Mansfield, La., trailers for motor trucks, parts, etc., has let contract to Iron & Steel Products Co., Inc., 3501 South Carrollton Street, New Orleans, for two one-story additions, 60 x 125 ft., and 50 x 260 ft. Cost over \$60,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until April 29 for steel barges for Pickwick Landing power dam; until May 1, steel towers for take-off service at Wheeler power dam hydroelectric station, units Nos. 3 and 4; until May 2, electric air heaters and auxiliary equipment for heating and ventilating systems at Wheeler power station, units Nos. 3 and 4.

John Morrell & Co., Mobile, Ala., meat packer, has asked bids on general contract for two-story addition to local packing plant. Cost about \$45,000 with equipment. Main offices are at Ottumwa, Iowa.

Coca-Cola Bottling Co., 1533 Bank Street, Louisville, has approved plans for new two-

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story and basement mechanical-bottling storage and distributing plant at Seventeenth and Hill Streets, 200 x 250 ft., with service and garage extension for company motor trucks. Cost close to \$100,000 with equipment. Jesse M. Shelton, Bona Allen Building, Atlanta, Ga., is architect.

◀ SOUTHWEST ▶

Mines Equipment Co., 1909 South Kings-highway, St. Louis, has let general contract to Woermann Construction Co., 3800 West Pine Boulevard, for one-story addition, 100 x 140 ft., and improvements in present plant. Cost over \$60,000 with equipment. Norman I. Bailey, 26 Fern Ridge, Valley Park, St. Louis, is architect.

Fahlin Aircraft Co., Columbia, Mo., has leased one-story building to be erected by city at municipal airport, for airplane manufacture, with parts production and assembling departments. Cost over \$40,000 with equipment. W. B. Cauthorn, city engineer, in charge.

City Council, Sterling, Kan., plans extensions and improvements in municipal power plant, including diesel engine-generator unit and accessory equipment. Cost about \$80,000. Bond issue has been voted in that amount. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Southland Paper Mills, Inc., Lufkin, Tex., plans expansion in local newsprint mill, including new units for pulp and paper-making divisions, with equipment to double capacity. Cost about \$3,000,000 with machinery. Financing will be arranged soon.

Edward Friedrich, 1117 East Commerce Street, San Antonio, Tex., refrigerating machinery and parts, has filed plans for four-story addition. Cost over \$65,000 with equipment.

◀ OHIO AND INDIANA ▶

Elyria Foundry Co., Elyria, Ohio, grey iron castings, has let general contract to Henry Heidrich, Elyria, for one-story addition. Cost about \$65,000 with equipment.

City Auto Stamping Co., Lint Avenue, Toledo, Ohio, plans one-story addition, about 80,000 sq. ft. of floor space, for die department, now occupying leased space. Work will begin in June. Cost close to \$500,000 with equipment.

Industrial Rayon Corp., West Ninety-eighth Street and Walford Avenue, Cleveland, has let general contract to George A. Rutherford Co., 2725 Prospect Avenue, for additions to branch mill near Painesville, Ohio, one-story, 80 x 225 ft., and one and two stories, 90 x 455 ft., and smaller structures. Cost about \$4,000,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects and engineers.

Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has let contract to Austin Co., Cleveland, for new one-story plant on 60-acre tract recently purchased. Cost close to \$500,000 with machinery.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 30 for eight motor-driven V-belt squaring shears (Circular 1401); until May 1, 40 hydraulic engine-driven pump assemblies, 85 oil pump assemblies, 40 engine-driven pump assemblies, 42 oil pump assemblies, 57 high-pressure oil pump assemblies, 194 oil pump assemblies (Circular 1400), 67 blowers and cleaners (Circular 1377), 200 valve assemblies (Circular 1385); until May 2, 39 motor-driven hydraulic fuel pump assemblies (Circular 1395), 400 automatic weigh auxiliary manual control strainer assemblies (Circular 1391); until May 3, seamless and heat-resistant steel tubing (Circular 1396), four oxygen flow indicators (Circular 1407).

Allison Engineering Division, General Motors Corp., Speedway City, Indianapolis, aircraft engines and parts, has let general contract to National Concrete Fire Proofing Co., Citizens' Building, Cleveland, for one-story addition, about 350,000 sq. ft. of floor space, for parts production and assembling depart-

ments. Cost close to \$800,000 with equipment. J. Lloyd Allen, Architects' and Builders' Building, Indianapolis, is architect.

◀ WESTERN PA. DIST. ▶

Cyclops Division, Universal Cyclops Steel Corp., East Spring Street, Titusville, Pa., has approved plans for one-story addition, 90 x 120 ft. Cost over \$75,000 with equipment. Structural steel award has been let to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Pittsburgh Plate Glass Co., Paint Division, Grant Building, Pittsburgh, plans new branch plant on 21-acre tract at Houston, Tex., consisting of three main one-story structures, with auxiliary buildings, tanks and other facilities. Cost about \$350,000 with machinery. Alfred C. Finn, Bankers' Mortgage Building, Houston, is architect.

◀ MICHIGAN DISTRICT ▶

Soss Mfg. Co., 647 East First Avenue, Roselle, N. J., automobile hardware and other metal goods, has asked bids on general contract for new one-story plant, 220 x 450 ft., on Hoover Road, near Detroit, where site recently was secured. Cost over \$250,000 with equipment. Company is operating branch plant at 105 Scotten Avenue, Detroit, which will be consolidated at new location. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects and engineers.

Huron Industries Corp., Alpena, Mich., mechanical equipment, plans rebuilding one-story foundry recently destroyed by fire. Loss close to \$50,000 with equipment.

Detroit Bevel Gear Co., 8130 Joseph Campbell Avenue, Detroit, plans one-story addition. Cost close to \$60,000 with equipment. Shreve, Anderson & Walker, Marquette Building, are architects and engineers.

◀ MIDDLE WEST ▶

Liquid Carbonic Corp., 3100 South Kedzie Avenue, Chicago, has approved plans for one and two-story branch plant at 1116 Hemphill Street, Houston, Tex., 52 x 200 ft., to replace structure recently destroyed by fire. Cost about \$150,000 with equipment. F. B. Hunt, first noted address, is company engineer.

Peabody Coal Co., 231 South LaSalle Street, Chicago, will begin work soon on new mechanical coal washing plant at Mine No. 7, near Kincaid, Ill. Cost close to \$1,000,000 with machinery. Allan & Garcia, 332 South Michigan Avenue, Chicago, are consulting engineers.

Constructing Quartermaster, Ordnance Department, Ordnance Depot, Savanna Proving Grounds, Savanna, Ill., asks bids until April 30 for four prefabricated steel buildings (Circular 6579-30).

Schwartz Mfg. Co., Two Rivers, Wis., buffing wheels and other products, will begin work soon on one-story addition, 180 x 200 ft. Cost over \$65,000 with equipment.

Waterloo Valve Spring Compressor, Inc., 1406 East Fourth Street, Waterloo, Iowa, compressors and auxiliary equipment, has let general contract to A. E. Mutton, 1812 Borch Avenue, for one-story plant, 60 x 100 ft. Nicholas Sulentic is president, in charge.

United States Engineer Office, Commerce Building, St. Paul, Minn., asks bids until April 30 for one a.c. electric generator unit and accessories for U. S. Boatyard at Fountain City, Wis. (Circular 923-40-51).

Swift & Co., Union Stock Yards, Chicago, Soy Bean Division, has let general contract to James Stewart Corp., 343 South Dearborn Street, for extensions in branch mill at Champaign, Ill., including storage bins and mechanical-handling equipment; also will install three new presses for extraction of soy bean oil and accessory equipment. Cost over \$200,000 with machinery.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until April 29 for generators, starters, voltage regulators and spare parts (Circular 851).

Wisconsin Electric Power Co., Milwaukee, has obtained permit to build a \$225,000 power house on Commerce Street as part of a \$4,000,000 enlarging and modernizing program.

◀ PACIFIC COAST ▶

Lockheed Aircraft Corp., Empire Avenue and Victory Place, Burbank, Cal., airplanes and parts, has asked bids on general contract for one-story assembly building No. 9, about 35,000 sq. ft. of floor space. Cost close to \$100,000 with equipment. This is third such unit that company has built since first of year. John and Donald B. Parkinson, Title Insurance Building, Los Angeles, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 30 for one motor-driven metal-cutting band saw (Schedule 1324), electric welding machine (Schedule 1315), metal spray gun, with wire feed and accessories, and metal spray gun, power feed and accessories (Schedule 1333), portable electric saw (Schedule 1343), single compartment, monorail type, externally-heated paint drying oven (Schedule 1321) for Alameda, Cal., air station; air compressor (Schedule 1304) for Seattle; two light-duty engine lathes (Schedules 1290 and 1336), both motor-driven; two motor-generator sets and spare parts (Schedule 1370), 147,200 lb. copper-nickel alloy condenser tubes (Schedule 1328) for Puget Sound Navy Yard; insulated electric cable (Schedule 1390); until May 7, three motor-driven plain milling machines (Schedule 1376) for Mare Island yard; 16 light-duty trailers (Schedule 1406); until May 3, motor-driven, floor-type sensitive drill (Schedule 1367) for San Diego Naval Air Station.

◀ CANADA ▶

Ruscia Brothers, 84 Woodycrest Avenue, Toronto, have been awarded contract for disposal plant and sewers for Hespeler, Ont., at cost of \$92,000. James, Proctor & Redfern, 36 Toronto Street, Toronto, are engineers.

Dominion Foundries & Steel, Ltd., Hamilton, Ont., has placed additional sub-trades in connection with construction of hot mill and foundry additions. Enlargement program, with equipment, will represent outlay of about \$1,000,000. Frid Construction Co., 128 King Street East, has general contract. Prack & Prack, 36 James Street South, are architects.

Canadian Associated Aircraft, Ltd., 1050 Beaver Hall Hill, Montreal, has awarded contract to Redfern Construction Co., Ltd., 36 Toronto Street, Toronto, for \$100,000 addition to plant at Malton, Ont. T. Pringle & Son, 36 Toronto Street, Toronto, are engineers.

Ottawa Aircraft, Ltd., 301 Salter Street, Ottawa, Ont., has awarded contract to Doran Construction Co., 78 Bank Street, for plant addition to cost \$60,000.

Lincoln Electric Co. of Canada, Ltd., 65 Bellwoods Avenue, Toronto, will build plant on Copeland Avenue, Leaside, Ont., for which new tenders are being called by architects Mathers & Haldenby, 96 Bloor Street West, Toronto.

Toronto Iron Works, Ltd., Eastern Avenue, Toronto, has let contract to Evan S. Martin, 16 Sauter Street, for a machine shop. H. G. Duer, 910 Lumsden Building, is architect.

Canada Cycle & Motor Co., Ltd., Weston, Ont., has awarded contract to Ramsay Contracting Co., Ltd., 39 Indian Road Crescent, for \$30,000 plant addition. T. Pringle & Son, 36 Toronto Street, Toronto, are engineers.

Canadian Celanese, Ltd., Drummondville, Que., has awarded contract to Stewart Construction Co., Ltd., 7 Dufferin Street, Sherbrooke, Que., for plant addition to cost \$150,000.

◀ FOREIGN ▶

Sandeman Brothers, Ltd., operating Ruchill Oil Works, Glasgow, Scotland, plans expansion in oil refinery, including equipment. Cost over \$125,000 with machinery.

National Steel Plan Executive Commission, Government of Brazil, Rio de Janeiro, recently organized, is arranging for establishment of a national steel and iron company, financed through both Federal and private capital, to build and operate one or more steel mills. Site for initial plant is being selected. Cost close to \$5,000,000.